PRICE 35 CENTS

MAY 1954

Welding Engineer

Welding sales continue to climb

see page 43

In This Issue

131 years of welding in our family ..... Page 50

New way to repair ductile-iron castings ..... Page 49

"Ole swimming hole" brought up to date ..... Page 56

AMERICAN WELDING SOCIETY SHOW—Buffalo, May 1954

SEE Page 46

A McGRAW-HILL PUBLICATION

RUGGED DEPENDABLE CABLE

FOR 50 YEARS *Wiremaker for Industry*

To You,

Belden's Golden Anniversary Means

—product performance that can come only from a "know-how" that has grown through actual service since the early days of the construction industry.

—an ability to cooperate in pioneering new wires to meet or anticipate industry's growing needs.

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TO BE CONTINUED

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For AC POWER or AC WELDING

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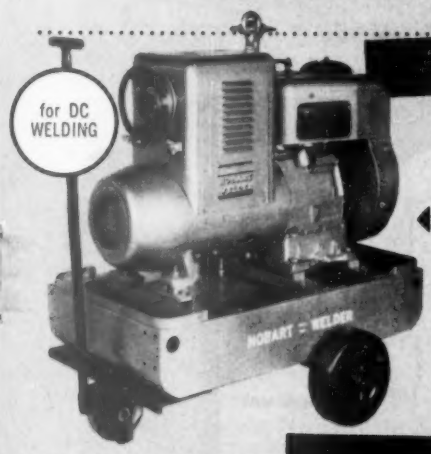

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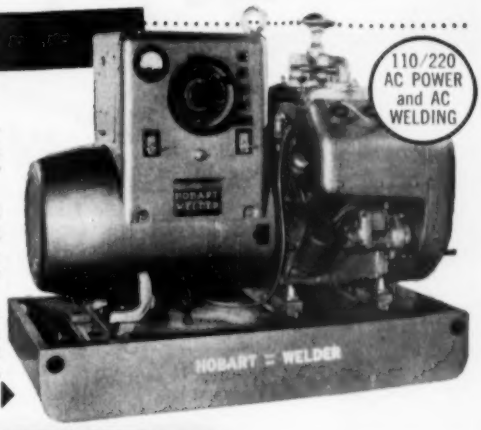

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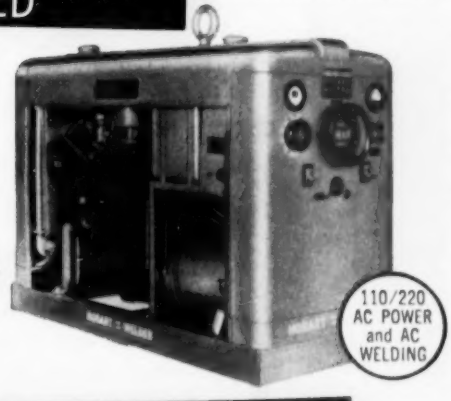
DC WATER COOLED—Gas engine driven welders with Remote Control, Self-starting and Dual Control, making possible 1000 combinations of welding heat are but a few of the many extras you get in Hobart.

AC POWER—AC WELDER—WATER COOLED—for general service or emergency use. For contractors, and others where operation may be carried on independent of electric power lines. As a welder, or runs motors, lights, tools, grinders, compressors, pumps, etc.



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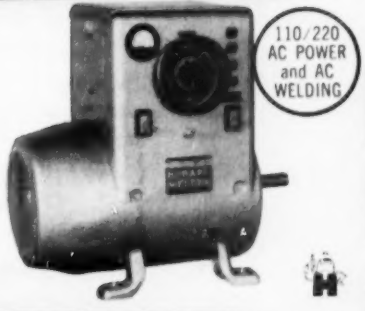
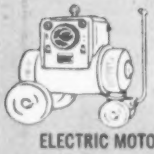
Now you can have the same advantages of welding and power units in a generator only that lets you quickly and easily belt or couple the unit to your own power source.

FOR DC WELDING—this generator only is ideal for building your own portable gasoline engine driven welder, by means of direct coupling to a gas engine or by means of power take off.

AC POWER—AC WELDER GENERATOR ONLY—with minimum investment you can supply your own power and have all the advantages of Hobart revolutionary AC-AC combination. Can be taken to the job for welding or used as electrical power source in the field.





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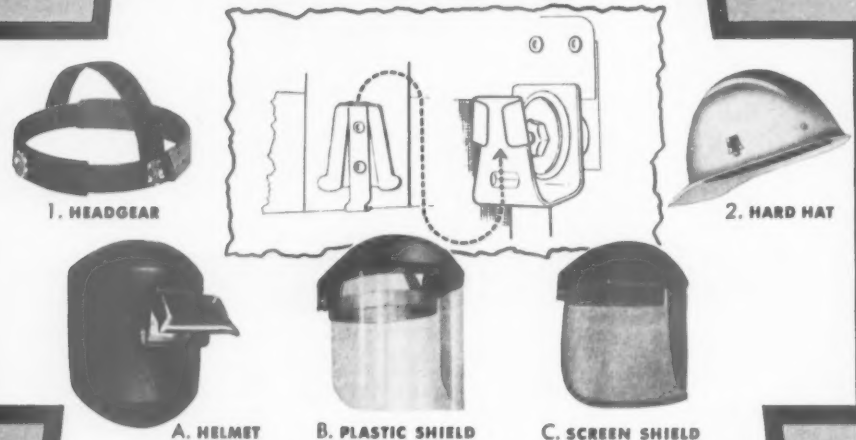
NEW Mounting



Assemble Your Own Combinations

Here's a way for you to save money on head, face, and eye protection equipment. Now you don't have to buy duplicate headgears or hats. If you need a helmet (A) and face shield (B), buy them along with only one headgear (1) or hard hat (2).

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MAY, 1954

SPECIAL FEATURE

How welding sales have climbed 43
T. B. Jefferson

CONVENTION

BUFFALO . . . this month 46
Clyde B. Clason

Among the exhibitors 47

MAINTENANCE

New way to repair ductile iron 49

131 years of welding in our family 50
Bert Lansing

FABRICATION

Nickel-clad vessel Mig welded 55
D. V. Wilcox and L. W. Kunkler

New farm implement center in western Canada 62
T. B. Jefferson

CONSTRUCTION

The "ole swimming hole" brought up to date 56
H. C. Phelps

Conveyor belt for back-up flux 64

DESIGN

Practical design for welding—II 58
Rex Cleveland

PRODUCTION

Fewer rejects, faster speed 61
Gilbert L. Bethel

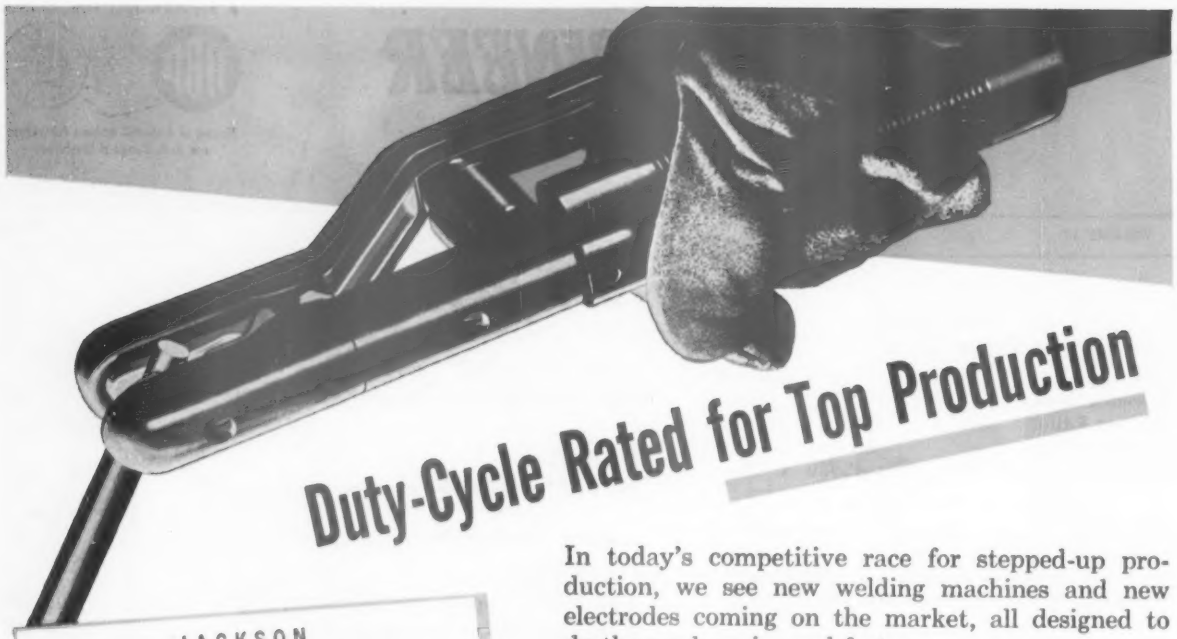
Creamery Package welds a new package 66

OPERATION

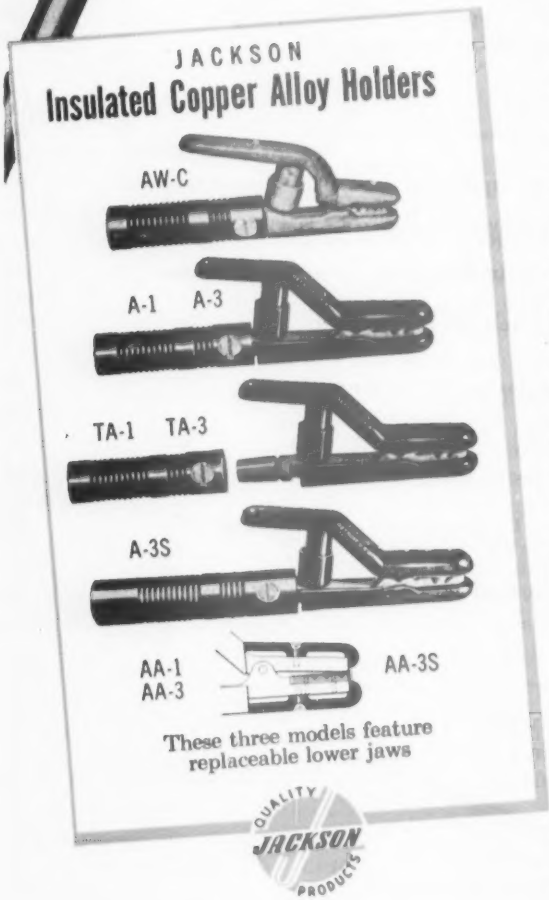
Powdered iron in coatings? 65
L. K. Stringham

DEPARTMENTS

News 5
Welding Info-Aids 33
Editorial: The leopards are whitewashing 41
Data sheet 164: Brinell hardness numbers of various loads 71
On the job 72
New products 74
Letters to the editor 86
People 98
Book reviews 101
30 years ago 102
Patents 103
Searchlight 105
Where to buy 105
Advertisers in this issue 106



Duty-Cycle Rated for Top Production



In today's competitive race for stepped-up production, we see new welding machines and new electrodes coming on the market, all designed to do the work easier and faster.

Therefore, in choosing the right electrode holder for a job, don't think of *rod size* alone. We must equally consider *amperage* and *cable size*, and today, more than ever, the required *number of electrodes per hour*. These four factors combined establish the *duty cycle*, that is the percentage of actual arc-time in any ten-minute period of work.

The following table shows the duty cycles possible with the various *Jackson Insulated Copper Alloy Holders*, based on using the largest rods and cables these holders will take, operating at each holder's rated amperage.

Holder Class	Model Number	Electrode Size	Rated Amperage	Cable Size	Duty Cycle
SMALL	AW-C	7/32″	250	1	50%
MEDIUM	A-1, AA-1 TA-1	1/4″	300	1/0	50%
LARGE	A-3, AA-3 TA-3	3/8″	500	3/0	50%
HEAVY-DUTY	A-3S	3/8″	500	3/0	65%
	AA-3S	3/8″	500	4/0	80%

This table will help you in making the right selection from these Jackson copper alloy holders. Using a superior 98% copper alloy heat treated for greater strength, hardness and conductivity, these holders permit highest duty cycles with ample margin of safety.

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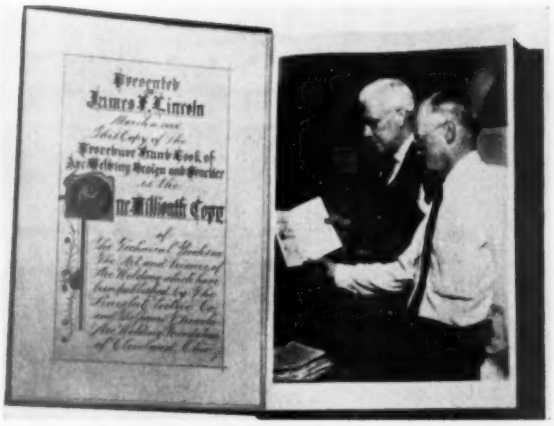
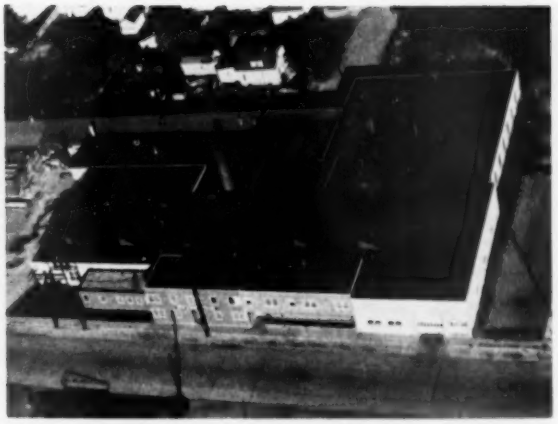


MILESTONE copy is presented to company president



MILLER Electric plant as viewed from air (see below)

NEWS

1,000,000 books on welding is Lincoln Electric's score

NUMBER of technical books on arc welding published and sold by The Lincoln Electric Co. and The James F. Lincoln Arc Welding Foundation, Cleveland, recently hit the 1,000,000 mark. The milestone text was an inscribed copy of *The Procedure Handbook of Arc Welding Design and Practice*, which was presented to J. F. Lincoln, president of the firm, by A. F. Davis, vice-president and secretary. (See picture above.)

The books, sold on a non-profit basis, have covered all phases of welding: instruction, process science, application in industry and agriculture for fabricating and maintenance, mechanical and structural design. Twenty-four titles have been published.

* * *

RWMA to aid research; cancels prize contest

RESISTANCE Welder Manufacturers' Association, Philadelphia, has announced that the annual contest for papers on resistance welding will not be conducted this year. Instead, the organization will furnish funds for grants-in-aid to worthwhile university researchers. Aims: (1) to secure basic information of value to the industry and (2) to encourage training of young men in resistance-welding research.

First grant will be for research on subject of "Spot Weld Aluminum with Single-Phase, 60-Cycle Current."

* * *

$9,000,000 pylon contract to Liquid Carbonic Corp.

PYLONS will be produced by The Liquid Carbonic Corp., Chicago, for Republic Aviation Corp. under a $9,000,000 contract, according to a recent announcement. This new defense contract is part of the jet fighter program of the U. S. Air Force.

* * *

We're moving!

EFFECTIVE May 1, the editorial offices of WELDING ENGINEER will be at 330 W. 42nd St., New York City 36. Although in the past this publication's business and circulation offices have been at that address, the editorial department has been located at 520 N. Michigan Ave., Chicago 11. All departments will now be located under one roof in the McGraw-Hill Building in New York City.

Please change your records!

Miller Electric Mfg. Co. celebrates 25th anniversary

TWENTY-five years ago, Niels Miller started to build welding machines in his basement. By 1932, he had built about 400 welders in those quarters. Today he is president of Miller Electric Mfg. Co., Appleton, Wis., one of the country's leading producers of arc-welding equipment.

The firm last month celebrated this quarter-century milestone with a surprise party for Mr. Miller, which was attended by employees and friends.

* * *

Break ground this month for Westinghouse metals plant

GROUND will be broken this month for the new metals plant to be built by Westinghouse Electric Corp. at Blairsville, Pa. The main building exterior is expected to be completed by end of this year, and most of the machinery and equipment will be installed and operating by mid-1955. Main purpose of the new plant will be to bridge the gap between research and commercial application of metals in the electrical industry.

* * *

April issue's cover picture furnished by Natkin & Co.

THROUGH an inadvertent error, WELDING ENGINEER neglected to credit Natkin & Co., Kansas City, Mo., for the picture used on the April cover. The photo showed a pipe-welding operation on an air conditioning system. Natkin & Co. is a firm of contractors and engineers in the fields of air conditioning, industrial piping, refrigeration, plumbing and heating.

NEWS . . . . . *from page 5*

Courtesy Linde Air Products Co.

SIXTEEN feet of Tig welds join aluminum castings

Courtesy Westinghouse Electric Corp.

FOOD compartments for refrigerators are seam welded

Mechanical horses welded from aluminum castings

TIG (tungsten inert-gas) welding is used extensively by Memphis Metal Mfg. Co., Memphis, in production of mechanical horses of the type often seen in amusement parks. Sixteen feet of such welds are used to join seven aluminum castings that form the horse itself, and the Tig process is also used in welding motor housings (sheet steel) and control columns (brass tubing) for these devices.

The aluminum castings are positioned in a jig during welding. An aluminum rod, ⅛ in. in diameter, provides filler metal. After the horse has been assembled, welds are ground smooth and the unit is wire-brushed. The sheet steel is welded without filler rod; a bronze filler rod is used in welding the control columns.

* * *

Welded pipe used in ice rink freezing unit

NEW artificial-ice system for Davis rink at Dartmouth College, Hanover, N. H., includes more than 10 miles of welded steel pipe. The extra-heavy pipe, in which cooling brine is circulated, was manufactured by Spang-Chalfant Division of The National Supply Co., Pittsburgh.

The 1-in. diameter pipe is welded together into 128 sets, each of which extends length of the floor—an area measuring 188 ft 8 in. by 85 ft 6 in. —then loops and returns to the starting end. It is laid on 4-in. centers. The main supply and return lines are of 8-in. pipe. The brine feed and return headers, 5-in. in diameter, are all located at one end of the rink. Suitable loops are provided in the headers to equalize the flow of brine through the pipe.

* * *

New AWS section formed in Wisconsin

AN Appleton, Wis., section of the American Welding Society was to have been activated last month. A series of general and special meetings has been held over the past several months. Temporary chairman is William Hart, and the secretary is Carl G. Malmberg.

* * *

Los Angeles distributor opens 5th store in area

ITS fifth store in the Los Angeles area was recently opened by Absco, Inc., welding equipment distributor. Located at 2202 S. Garfield Ave. in that city, the building occupies 12,000 sq ft. A fenced-in loading area will accommodate 12 trucks at once. The building includes a separate room for repair work and a demonstration room with a complete power panel for handling various types of welding equipment.

Many welds go into refrigerator unit

WELDING plays an important part in the manufacture of refrigerators. At the Columbus, Ohio, plant of Westinghouse Electric Corp.'s Electric Appliance Division, one such operation is the resistance welding of food compartments. In the picture above, a stamped, sheet-metal top piece and bottom piece are being seam welded to a stamped and formed sheet metal skirt or wrapper that makes the sides and back. The top is inserted into the left side of the welder, the bottom into the right. These are positioned and held in place by electromagnets. The skirt fits over the outside and between the top and bottom. Welding is sequenced automatically.

* * *

Titanium ore melted by inert arc

ANOTHER of welding's contributions to industrial progress is in refining titanium—a tricky metal that tends to oxidize at 700 F.

Much of the pure titanium available to industry is being produced in furnaces which basically are huge arc-welding operations. According to information from A. O. Smith Corp., Milwaukee, this is accomplished by Mig (metal inert-gas) welding wherein the consumable electrode is a 2-in. square bar of titanium "sponge." This sponge is welded into long bars by joining the 18 to 23-in.-long blocks received from producers of the ore.

The furnace is of the crucible type, ranging from 3 to 10 in. in diameter. An ingot from 200 lb to 2 tons can

(Continued on page 90)

no successful improvements have ever gone contrary to the laws of nature...

Man has improved many things but every progress he has achieved followed the basic blueprints of mother nature. For hand cutting, for instance, no matter where one places the high pressure oxygen valve lever, one may not do better than to follow the natural design of man's hand.

It's the human thumb which, in the first place, made the hand the wonderful, dextrous marvel it is. And, it's the thumb which is best suited to work the valve lever without fatigue, without causing the hand and torch to shake or tremble. Here is a truly fine cutting torch and it's

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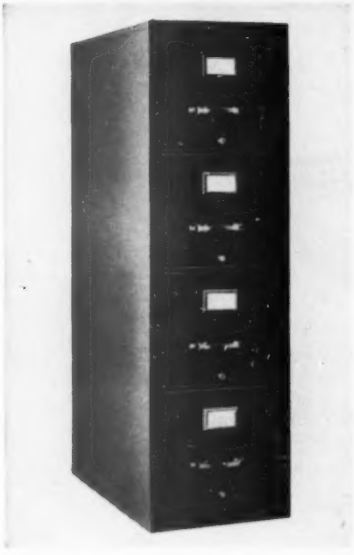
STRONG JOINT on desk housing is made with Tobin Bronze Welding Rod.



COLUMBIA Steel Office Equipment Co. also produces attractive filing cabinets like this one by braze-welding with Tobin Bronze Welding Rod.

Office equipment maker uses Tobin Bronze to braze-weld stronger, cleaner joints

On desks and filing cabinets it's important that all corner joints have adequate rigidity and strength, and that they look clean and neat after enamel finishing. Whether they will or not depends largely on the welds at these points.

Columbia Steel Office Equipment Co., Philadelphia, has this problem licked. First, they spot-weld all desks and filing cabinets. Then, units are braze-welded with Tobin Bronze* Welding Rods (3/32 in.). Columbia says, "Braze-welding with Tobin Bronze provides greater strength at the joints . . . helps to make our equipment more attractive. Our work goes faster, too. Tobin Bronze flows freely, 'tins' quickly, gives strong, neat bonds. Braze-welding with Tobin Bronze is the fastest, most economical way we've found to do the job."

ANACONDA Welding Rods for many types of production and repair jobs are available from distributors throughout the United States. *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ont.* 54136

*Reg. U. S. Pat. Off.

ANACONDA®

Welding Rods

Anaconda Copper-372 • Tobin Bronze-481 • Anaconda-997 (Low Fuming) Bronze • Nickel Silver-828 • Cupro Nickel-826 • Everdur-1010 • Ambraloy-928 • Phosphor Bronze-351 • Phosphor Bronze-354.

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*Meets A.S.T.M. Specification D-752 (Neoprene sheath for heavy-duty service).

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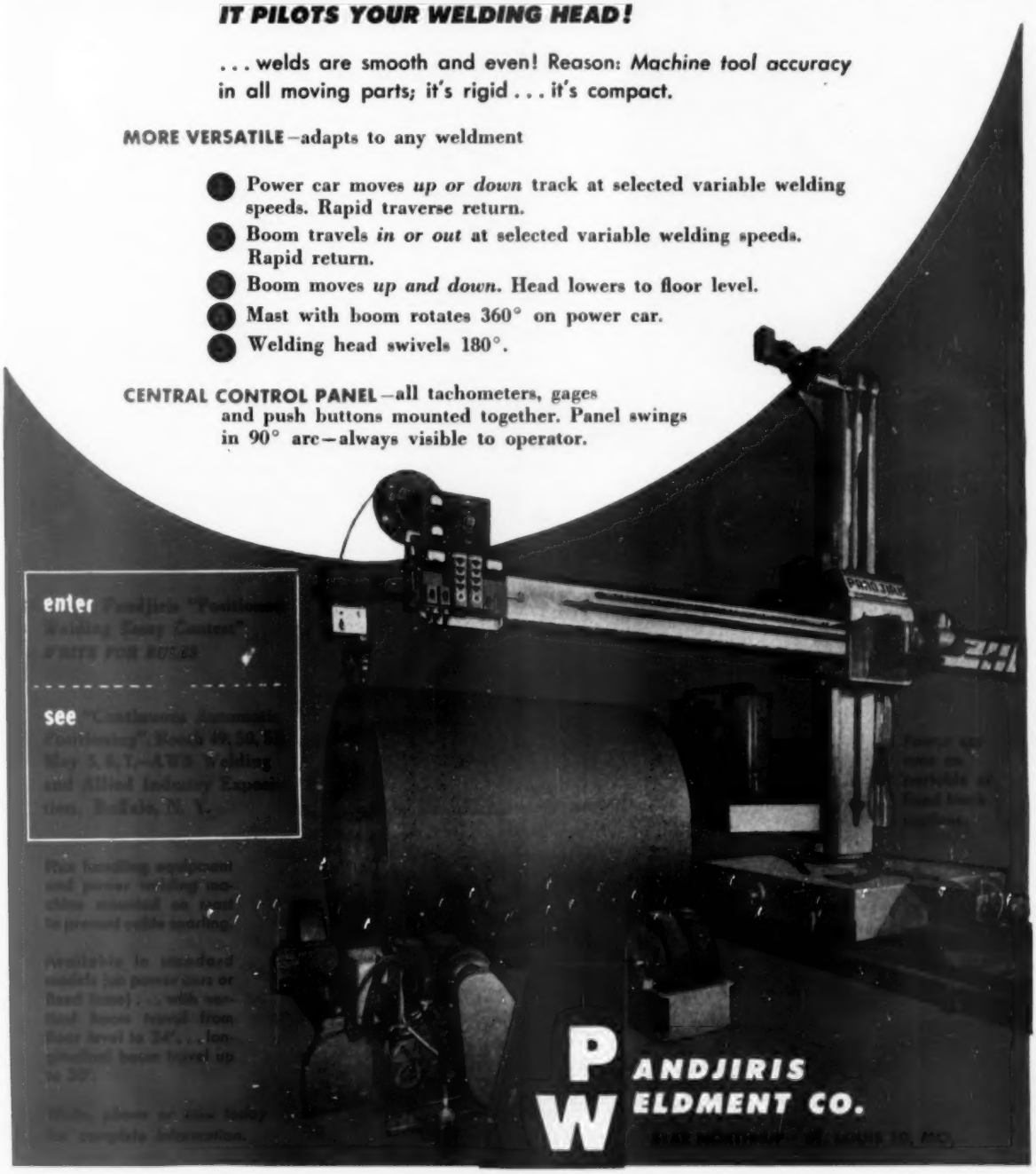
- Boom travels *in or out* at selected variable welding speeds. Rapid return.
- Boom moves *up and down*. Head lowers to floor level.
- Mast with boom rotates 360° on power car.
- Welding head swivels 180°.

CENTRAL CONTROL PANEL—all tachometers, gages and push buttons mounted together. Panel swings in 90° arc—always visible to operator.



PANDJIRIS WELDMENT CO.

Announcing the NEW amazing SELLSTROM *Fiber Glass* WELDING HELMET

The only helmet with these advanced features

Because of its greater strength and water resistance, the new Sellstrom No. 230 Fiber Glass Helmet should outlast 5 ordinary fiber helmets.
It is available with either the Standard Front Loading Plate Holder, as shown above, or the new "S" Lift Front Plate Holder shown below.

Your Choice of Headgear

The Sellstrom No. 230 Fiber Glass Helmet may be fitted with either the Standard Headgear No. WMXK shown above or the new Sel-O-Matic "M" model headgear shown at the right — which can be easily adjusted with one hand while the helmet is on the head.

1. 400% Stronger Than Ordinary Helmet
An 8 ounce steel ball, dropped from a height of 5 feet onto the Sellstrom Fiber Glass Welding Helmet, merely bounced from the helmet. The same ball, dropped from the same height onto an ordinary fiber helmet, cracked it.

2. A Better Insulator from Heat
Made of Fiber Glass, the perfect insulator, this Sellstrom Helmet transmits less heat than ordinary helmet — keeps face cooler.

3. More Resistant to Moisture
After immersion for 48 hours in salt solution of 160°F., the Fiber Glass Helmet absorbed less than ½ ounce of moisture. Holds its shape indefinitely.

4. Lightest Helmet of Its Kind

5. Choice of Plate Holders and Headgear

TEST A SAMPLE—Satisfaction Guaranteed!

Let us ship you a sample Sellstrom No. 230 Fiber Glass Helmet equipped with the famous Sel-O-Matic headgear and the new "Lift Front" plate holder on a 30 day memo, with the understanding that if you are not entirely satisfied, you can return it for credit. We will also give you the name and address of a nearby dealer who can supply your future requirements. The price—no higher than for an ordinary quality helmet. Send for your sample today!

Ask your dealer or write us for a copy of this 60 page buying guide to more than 300 Eye and Face Safeguards.

Mr. Dealer: The interchangeability of headgears and plate holders for this new Sellstrom Fiber Glass helmet means maximum profit and minimum inventory for you. Write for details!

sellstrom safeguards

Designed for COMFORT

SELLSTROM MANUFACTURING COMPANY
626 North Aberdeen Street · Chicago 22, Illinois

Composite photo of one torch and jet mixer with three different welding tips. 13, 7 and 1.
two new reasons
why the AIRCO 800 is the...
MOST VERSATILE TORCH YOU CAN BUY
2. NEW JET MIXER
1. NEW CUTTING ATTACHMENT

The Airco Style 800 torch will handle any welding, heating or cutting job, thanks to the brand new Airco Jet Mixer and two completely redesigned cutting attachments.

The new Jet Mixer gives you perfectly stable flame control with all gas flows. Cyclonic action swirls the gases together, mixing them completely, within a tip size range from 0 to 14 inclusive. Rubber gas sealing rings provide a gastight seal with hand tightening, no wrench required . . . saves time in tip changes.

New heavy-duty cutting attachment takes all standard tips; cuts steel up to 8" thick! Medium-duty attachment available for lighter service. Both have rubber gas sealing rings, plus mixers which can be easily removed for cleaning, if necessary.

Owners of Style 800 torches can use the new Jet Mixer and cutting attachments with their present torches. For details, write to Air Reduction or see your Airco dealer, asking for your copy of Catalog 818, "Hand torches for gas welding and cutting."

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

at the frontiers of progress you'll find...

AN AIR REDUCTION PRODUCT

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Magnolia Company
Air Reduction Pacific Company

Represented Internationally by
Airco Company International

Foreign Subsidiaries: Air Reduction Canada Limited, Cuban Air Products Corporation

Steady Progress Since 1905

Approved by Underwriters' Laboratories

HARRIS

MULTI STAGE COPYRIGHTED

REGULATORS

CHECK THESE OUTSTANDING FEATURES:

- √ Positively insures correct flame.
- √ Principal is revolutionary, yet simple in design.
- √ Two-Regulators-in-One.
- √ "Safety Stage" protects the Second Stage.
- √ Full Cylinder Pressure can be turned on with adjusting screw in any position without damage to the Regulator.
- √ Unique Filter Design protects Regulator from dirt and rust particles.
- √ All Valves close "with the pressure"—an important Safety Feature.

The Truest Measure of Progress is the Record of Achievement. In almost 50 years, Harris has set an astounding mark in successful product development. One of the many Harris "Firsts" is the Multi-Stage Regulator which enjoys world-wide acclaim and has an unparalleled record of Safety, Dependability and Accuracy.

Harris' long established distributors, located in all principal cities in the United States and Foreign Countries, are at your service.

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

Bronze-Arc Mn...

the First and Only ELECTRODE for welding Manganese Bronze

This 2000 lb. manganese bronze casting had areas of excessive porosity in the "as cast" condition. Bronze-Arc Mn was selected for the repair because good color match, machinability, and soundness were important. The casting passed X-Ray tests after repair with Bronze-Arc Mn.

OVEN FRESH BRONZE-ARC Mn electrodes are packed in the familiar ALLOY RODS red-and-yellow, hermetically sealed metal containers.

...welds *without* high preheating *without* distortion and warpage

Now you can do it... weld manganese bronze castings, reclaim and repair manganese bronze ship propellers, fabricate manganese bronze assemblies with Bronze-Arc Mn.

Never before could you weld manganese bronze without high preheat and interpass temperatures—but you can with Bronze-Arc Mn. And that eliminates a major cause of distortion and warpage. Bronze-Arc Mn welds have excellent physicals—and the chemical composition is the same as the basic material.

Developing electrodes for hard-to-weld alloys is a job that never ends at Alloy Rods Company. New Bronze-Arc Mn, the first and only electrode for electric arc welding of manganese bronze, is proof of Alloy Rods continuing leadership in research.

Put Bronze-Arc Mn to your own test—order a ten pound container from your distributor today.

Alloy Rods Co.

General Offices and Plant • York 2, Pennsylvania
Pacific Coast Sales Offices and Plant, El Segundo, Calif.

ARCALOY Stainless Steel Electrodes
BRONZE-ARC Bronze Electrodes
NICKEL-ARC Electrodes for Cast Iron
TOOL-ARC Electrodes for Tools and Dies
WEAR-ARC Hard-Facing Electrodes
WELD-ARC Low Hydrogen Electrodes

no finer electrodes made...anywhere

Get all the Facts... **Fill out this coupon and we'll send you the complete story on the new Bronze-Arc Mn electrodes.**

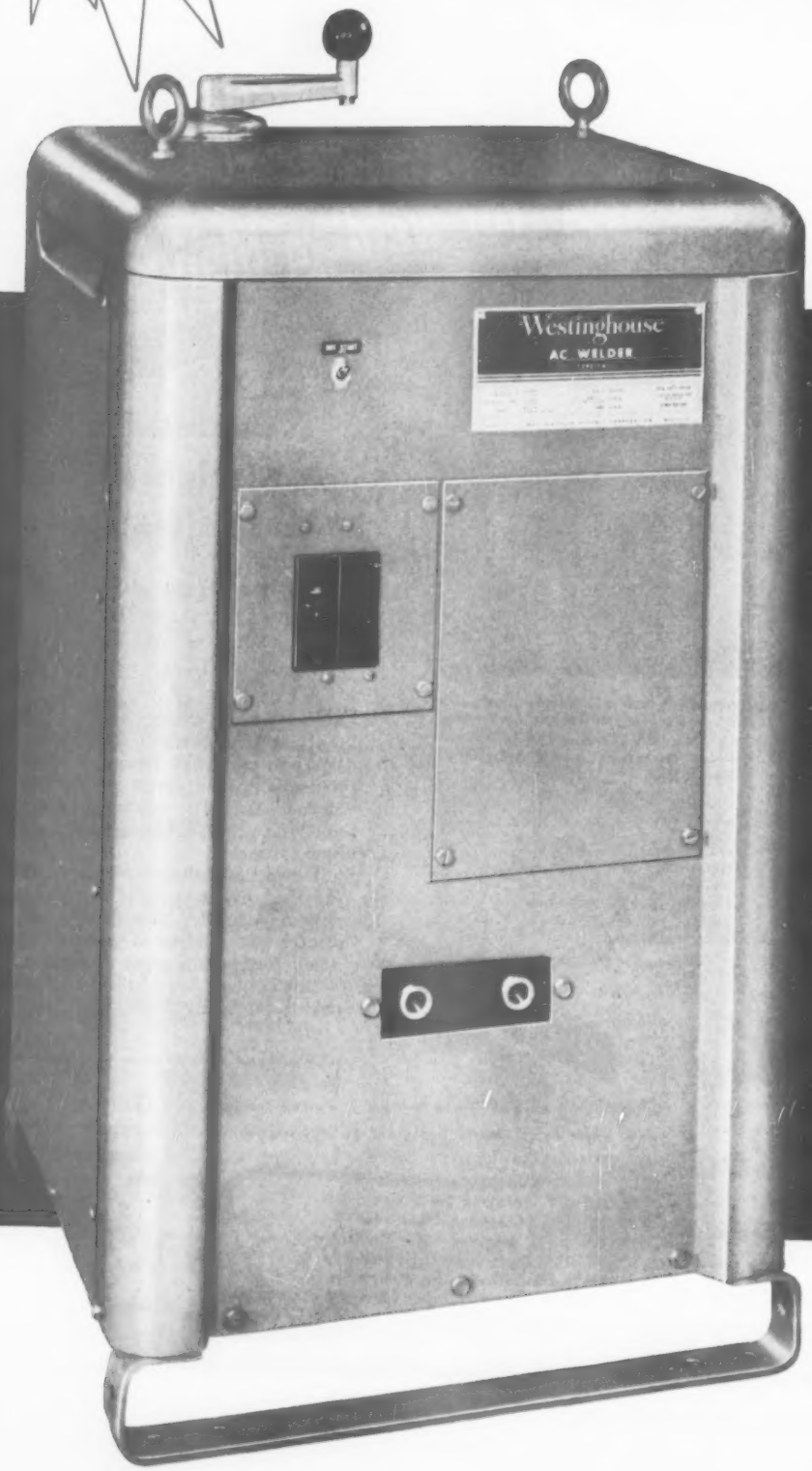
Name.....

Company Name.....

Street Address.....

City.....*State*.....

THE NEW WESTINGHOUSE A-C WELDER...



TYPE "TA"... the newest

and most modern A-C arc Welding machine

This new A-C Welder again fills out the complete line of the most modern welding equipment available today . . . a welder that is a worthy companion of the recently announced Westinghouse "RA", d-c machine.

The *completely new* Westinghouse "TA" is an a-c welder that provides easier operation, a wider work range, higher operating efficiency and higher quality welds. Each design feature is the result of continuous research and years of "on-the-job" welder performance.

This new compact a-c welder is another step ahead by Westinghouse, the pioneer in welding processes and equipment manufacturing.

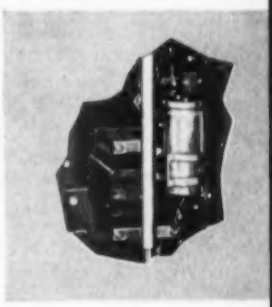
Here are some of the many exclusive features of the new "TA" that can mean superior welding performance to you.

thermal overload protection

There's no problem of coil overheating because of the exclusive AB De-Ion Circuit Breaker. A positive, quick-acting Thermoguard imbedded right in the transformer windings energizes a shunt trip mechanism, causing the circuit breaker to automatically open before harmful high temperatures can be reached.

hot start control

For that instant arc when starting to weld, the hot start control automatically supplies an additional surge of current to the welding arc the instant it is struck. It enables the operator to strike an arc at low current settings and is particularly helpful on applications involving small diameter electrodes and light metal.



single range current control

You just can't beat the ease of current adjustment of this new A-C Welder. A single, conveniently topmounted control provides current settings throughout the entire range—minimum to maximum—without changing cables, taps or switches. An easily read calibrated dial is provided as a part of the control.

weatherized construction

You can count on the new TA Welder for *any* application . . . regardless of location! The new Westinghouse TA is designed to provide uninterrupted service with maximum protection against dirt, dust, water and weather. The enclosure case is BONDERIZED and all external control parts are shielded or recessed for added protection.

See your nearest Westinghouse representative for the free booklet, B-6367, on the all-new Westinghouse "TA" Welder, or write to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. J-21843

YOU CAN BE SURE... IF IT'S

Westinghouse

VISIT OUR BOOTH NO. 12 AWS SHOW

WAGNER'S "HI-AMP" Holders And Clamps

F2 200 AMP.

F3 300 AMP.

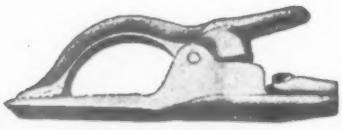
Ask Your Dealer For Full Information

FF5 500 AMP.

"500" 500 AMP.

Weld with Wagner

- STREAMLINED
- COOL RUNNING
- NEW WAGNERLOY METAL
- FIBRE GLASS JAW INSULATION



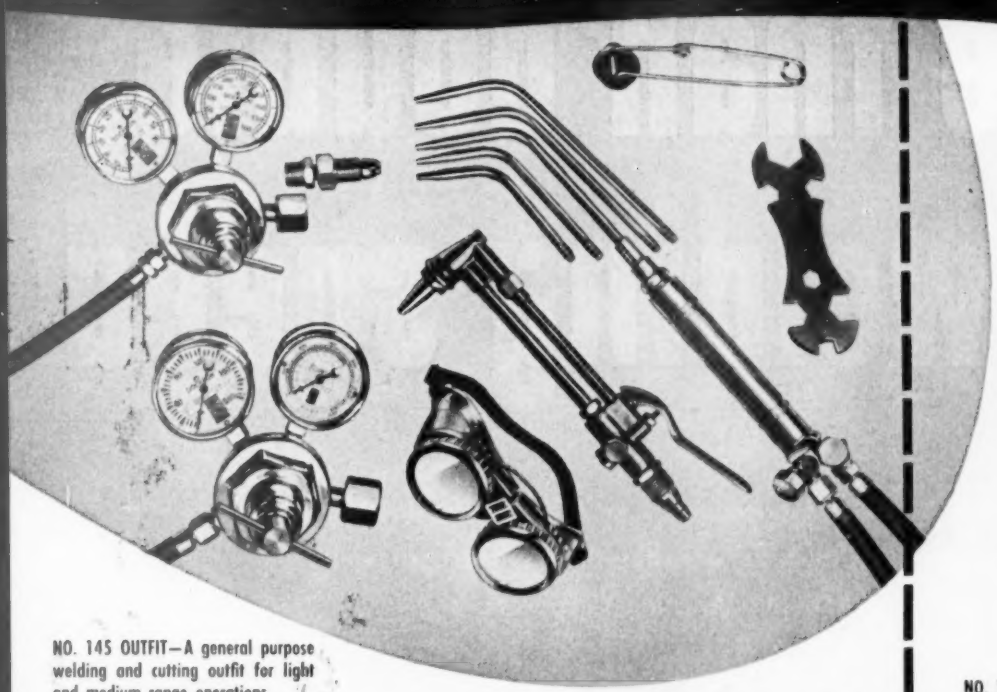
"300" 300 AMP.

"200" 200 AMP.

WAGNER WELDING PRODUCTS

350 WEST ADAMS ST. JACKSON, MO.

WITH A COMPLETE *Dockson* WELDING & CUTTING OUTFIT



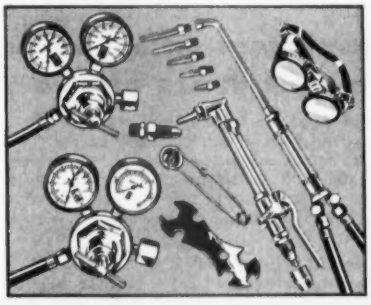
NO. 145 OUTFIT—A general purpose welding and cutting outfit for light and medium range operations.

Dockson Outfits are made up after careful analysis to handle a wide range of welding and cutting jobs.

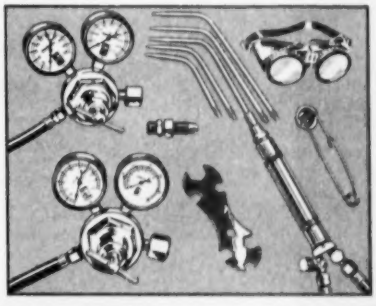
BUILT FOR BETTER SERVICE—Dockson Outfits are soundly designed and made of the finest materials to give you maximum versatility at the lowest cost.

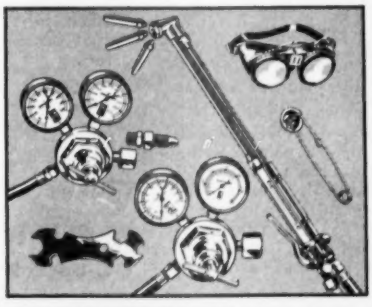
Dockson Outfits are backed by over 30 years of experience in building quality, high performance, rugged equipment. There is a Dockson Outfit for ALL your requirements.

NO. 156 OUTFIT—A complete welding and cutting outfit for light range operations.

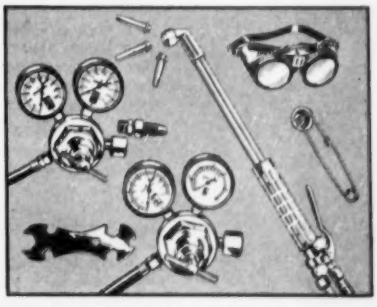


NO. 105 OUTFIT—A complete welding outfit for light through heavy-duty general welding.





NO. 165 OUTFIT—A general purpose complete range cutting outfit.



NO. 167 OUTFIT—A heavy-duty, all purpose cutting outfit.

Dockson

CORPORATION

439 NASH AVENUE

DETROIT 7, MICHIGAN

More than doubles welding speed

30 P&H TH-200 high-frequency machines make inert gas arc welding 2½ to 3 times faster than former gas welding at Republic Aviation Corporation

No replacement maintenance in three and a half years of two-shift operation

You don't have to take our word for the outstanding performance record of P&H Welders. The following statements are actual quotes from a certified report issued by the H. P. Gould Co. of Chicago, who made an impartial study of welding operations at Republic Aviation Corporation, Farmingdale, L. I., N. Y.

"In the building of faster and better aircraft, new developments in welding have played an important part and P&H high-frequency inert gas welding has proved that it can solve the problems of welding aluminum alloys.

"Three and a half years ago, Republic Aviation tested P&H TH-200 HF Inert Gas AC Arc Welders, and evaluated them against the existing equipment in the plant, as well as against outside competition.

"P&H welders of four different types are now used in four locations in the plant, for the welding of hundreds of different parts. In general, they are welding aluminum alloys from .032" thickness up to .250", and heat-resisting alloys from .010" up to a thickness of .093". For arc-welding alloy steels (4130, 4140, 8630, 8740, etc.), experience has proved P&H electrode AW-4 most satisfactory, and it is used exclusively.

"Republic Aviation welding engineers back up the claim of the makers that P&H welders require very little maintenance. The 30 high-frequency arc welders have had no replacement maintenance whatever in three and a half years of two-shift operation — and the operating cost of each P&H TH-200 HF Welder is only 40¢ per day."

Like Republic Aviation, whose studies show P&H inert gas arc welding to be 2½ to 3 times as fast as former gas welding, you, too, can enjoy the money-saving advantages of P&H Arc Welders with Dial-lectric Control. You, too, can get faster, better welds at lower cost.

We've given you the Republic Aviation story in a nutshell. You can get all the detailed facts and figures by reading Gould Report No. 5311. Write for your copy today.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4513 WEST NATIONAL AVE. • MILWAUKEE 46, WIS.

the P&H *Line*

P&H welding equipment is manufactured and sold in Canada by
REGENT EQUIPMENT MANUFACTURING COMPANY LTD.
455 King Street West • Toronto, Ontario, Canada

2600

Going into Republic Aviation's "Thunderstreak" are the products and supplies of over 10,000 suppliers and subcontractors, many of whom take advantage of the same welding techniques used so effectively by Republic Aviation.

Republic Aviation meters welding current down to 5 amperes on the TH-200 HF welders. P&H's instantaneous heat control and built-in high-frequency feature permit easy regulation of high-frequency volume for individual jobs.

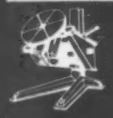
with P&H

Republic Aviation operates P&H high-frequency welders as standard metallic arc welders, also, so that duplicate equipment does not have to be purchased.

America's most complete line of arc-welding equipment and electrodes

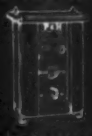
P&H AC WELDER

A full range of sizes up to 625 amps. (NEMA-rated). All are connectable to 220 or 440 volts—550 volts on request. Dial-lectric instantaneous Remote Control is fingertip control — gives you any heat you want — right at the work.



P&H POSITIONERS

One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs — remote control and hand operated models.



THE FIRST AND ONLY AC/DC WELDER

Just a flip of a switch and you can have AC or DC welding current. This new 200-amp machine also has Dial-lectric Control for instantaneous heat selection at the work.

P&H DC RECTIFIER WELDER

Four sizes—200, 300, 400, and 500 amps. (NEMA-rated). No moving coils—no bearings, brushes, commutator, brush riggings, etc. Dial-lectric Control gives you fingertip heat-control at the work.

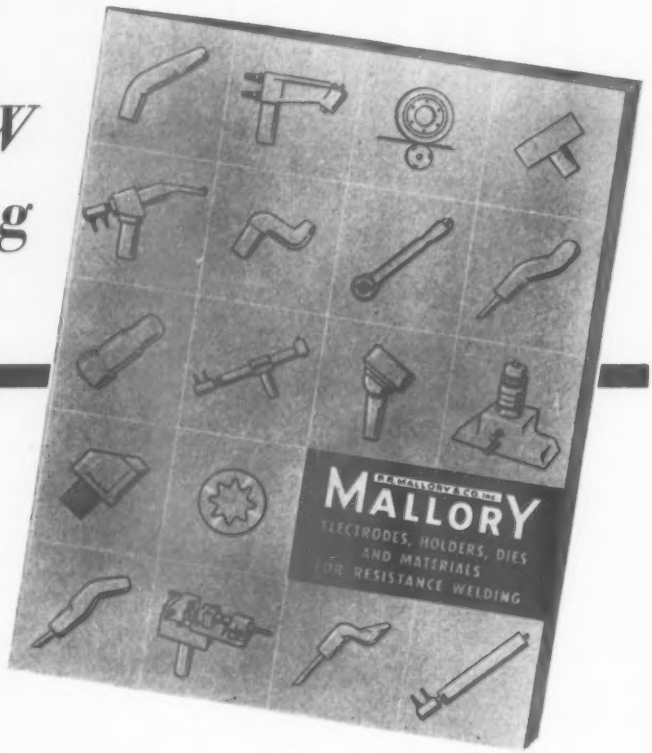
P&H ELECTRODES

A type and size for every job—to give you cleaner, sounder welds at lower cost on mild steel, cast iron, "hard-to-weld" steels, stainless steels, or hard surfacing.

Save the time and cost of "specials" by checking Mallory standard stock

Many of the resistance welding electrodes, holders and accessories that you've been considering as "special" are probably standard, stock items for Mallory. Get acquainted with the varied line of welding supplies available from Mallory; you'll save the extra cost of many custom-made items, and you'll get prompt deliveries from warehouse stocks.

Write for this NEW Resistance Welding Catalog



Anyone concerned with the specifying or purchasing of welding materials will find the new Mallory catalog a valuable reference source. It covers the complete list of all Mallory electrodes, seam welding wheels, holders, forgings, dies and materials . . . all grouped in easy-to-use sectional arrangement. Included for the first time are full specifications for heavy duty "Nu-Twist" and "Premium" holders, and expanded data on welding dies. A simplified coding system is used for identifying the many types of bent electrodes. All Mallory distributors are listed.

Get your copy now, through your Mallory distributor or by writing to Mallory today.

Expect More . . .
Get More from MALLORY

In Canada, made and sold by Johnson Matthey and Mallory Ltd., 110 Industry Street, Toronto 15, Ontario

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

Serving Industry with These Products:
Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

AT WENDT-SONIS A LINDBERG INDUCTION HEATING UNIT

ups tool tip brazing 135% . . . replaces two units

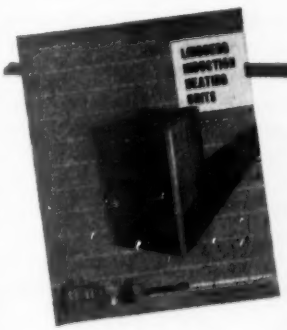
Production brazing of carbide tip tools has soared from 270 to more than 600 an hour since Wendt-Sonis, Hannibal, Mo., tool manufacturer, installed a Lindberg induction heating unit.

Two operators, fluxing parts and putting brazing metal and carbide tool tips in place, load the assemblies on a conveyor belt that passes a continuous stream of work through a specially designed, long hair-pin type heating coil.

Production is speeded because 14 tool assemblies . . . not just one . . . are in the heating field at any given time. The first tool on the conveyor passes *from* the heating area, leaving 13 others *still in* the field of heat, with tool number 15 *just entering* the coil area.

Production, formerly through two smaller units, totalled only 135 tools per hour, per unit, and required four operators. Thus the new equipment frees two operators for other important work.

If your requirements call for production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, a Lindberg induction heating unit can better your production picture . . . minimize costs . . . increase profits.



Ask for a copy of Bulletin 1440. It pictures and describes standard models . . . illustrates 11 cost reducing features . . . lists applications . . . shows accessory equipment.

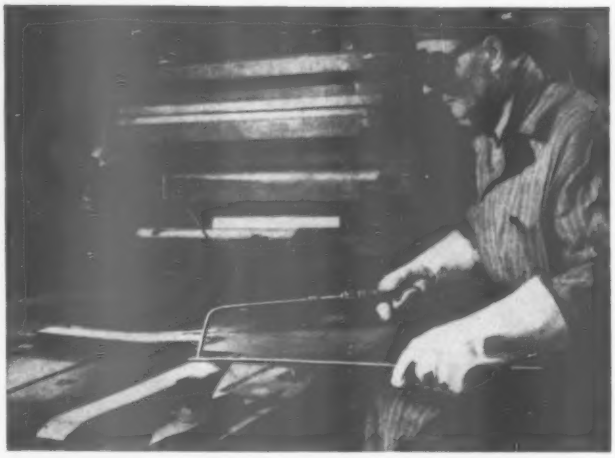
LINDBERG HIGH FREQUENCY DIVISION

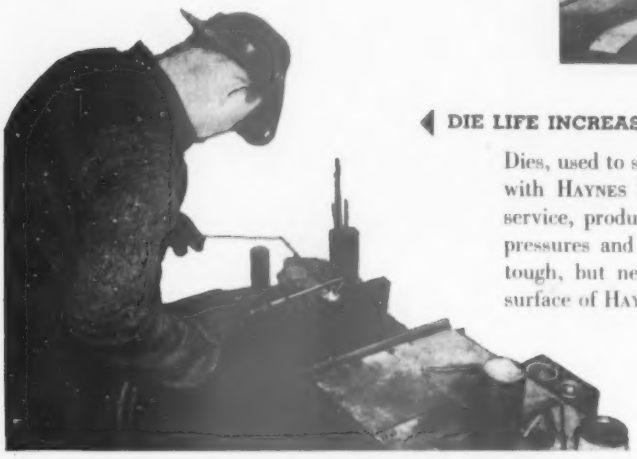
Lindberg Engineering Company, 2477 West Hubbard Street, Chicago 12, Illinois

Hard-Facing Helped Here... it Can Help You Too!

LIFE INCREASED 400%

Hard-facing these entry guides with a wear- and heat-resistant HAYNES STELLITE alloy increases their service life from 4 to 5 times. Unprotected guides failed after handling only 40 tons of hot steel bars, while the ones protected with HAYNES STELLITE alloy handled up to 200 tons. The guides are subjected to continual abrasion and heat from the hot steel passing through them.





DIE LIFE INCREASED 500%

Dies, used to shape refractory tile, last 5 times longer when hard-faced with HAYNES STELLITE alloys. Hard-faced dies have given 10 years' service, producing up to 500,000 tiles. The dies have to resist high pressures and abrasion from dry press operations. Unfaced dies are tough, but need the wear-resistance gained from a hard, protective surface of HAYNES STELLITE alloys.

AN ALLOY FOR EVERY JOB

There are 14 different HAYNES hard-facing alloys. Some are hard and abrasion-resistant, some are tough and ductile, capable of withstanding the shock of severe impact; others give extraordinary service under conditions of corrosion, erosion, and heat. Descriptions of each alloy and procedures for applying it are included in the booklet, "HAYNES Alloys Hard-Facing Manual." Write today for your free copy.

HARD-FACE AND SAVE WITH

HAYNES *alloys*

Trade-Mark

Hard-facing products made from cobalt-base alloys, nickel-base alloys, iron-base alloys, and cast tungsten carbide in the form of tube rods and coils.

"Haynes" and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.

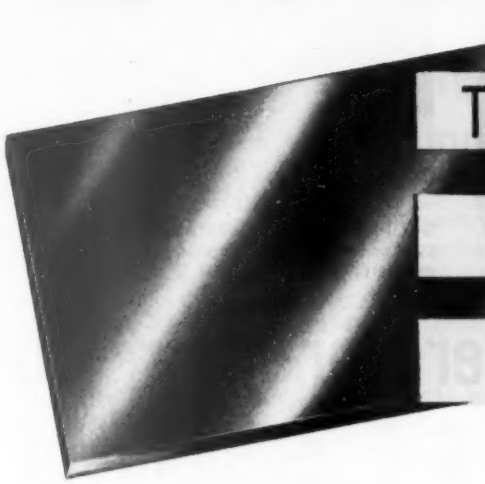
Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles—New York—San Francisco—Tulsa

PENOPTIC

INGENUITY PRESENTS A

NEW PRODUCT THAT

CUTS COSTS 40%



The First Fire-Polished Welding Filter Plates Ever Offered

Again, Penoptic is first to bring you the most value for your welding dollar. These new fire-polished welding plates are far superior in quality, far lower in price than any heretofore available.

Past methods of manufacturing welding plate glass entailed a slow and costly fabrication operation. To eliminate this cost-increasing production factor, a ***Continuous-Melt, Optical Glass Manufacturing Process*** has now been adapted to the making of welding glass.

The results are welding plates with unexcelled uniform shade characteristics and with fire-polished surfaces much more resistant to scratches than any plate surfaces ever offered; plates that meet all qualifications for electric and acetylene welding.

Only this new fire-polishing process teamed with Penoptic's direct-to-you distribution makes this 40% saving possible. Be first to cut your welding plate costs almost in half! Be sure to specify PENOPTIC on your next welding plate order! Available now in sizes 2" x 4¼" and 2" x 4⅛" in shade numbers 9, 10 and 11.

For Prices and Full Information Write Directly To Pennsylvania Optical Company, Reading, Pennsylvania or 1712 Taraval Street, San Francisco 16, Calif.

Order Direct and Save!

PENNSYLVANIA OPTICAL COMPANY

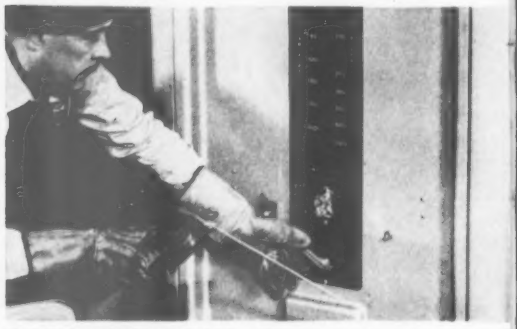
READING, PENNSYLVANIA

Known For Fine Ophthalmic Products Since 1886

WELDING ARCS NEWS

G-E MOTOR-GENERATOR WELDERS are simple to operate. A single-dial, dual-control current indicator makes it easy for you to set and check current—to get the best in welding performance.

G-E AC TRANSFORMER WELDERS feature instant arc striking through automatic hot-start, and capacitor-stabilized arc.



G-E RECTIFIER WELDERS offer you quiet, low-cost operation, plus the advantages of motor-generator welders.

Choose the best welder for your job from the full line of G-E equipment

Only G.E. offers all three—a-c, m-g, and rectifier

Any welder may "do," but only one type is *best* suited to your particular job. Only one will provide top performance at the lowest possible cost.

You will find this particular welder in the complete General Electric line—the only line which includes all three: a-c, m-g, and rectifier. Choose the right welder for your job; choose from the complete line.

AC SET PROVIDES EASY-TO-HANDLE ARC

For welding heavy sections at high travel speeds—without troublesome arc blow—select a G-E a-c welder. You can use bigger electrodes, higher current—make fewer passes. G-E a-c welders give you easy starting and a stable arc for dependable operation.

MG SET OFFERS UNIQUE INTERACTOR

For the wide variety of industrial applications where d-c welding works best, select a G-E motor-generator set. This set offers the unique interactor, which smooths out voltage fluctuations—producing a steady arc, and stronger welds.

Single-dial, dual-control makes it easy for you to choose the proper current and voltage setting to give top welding performance.

RECTIFIER SET HAS MANY AC, DC BENEFITS

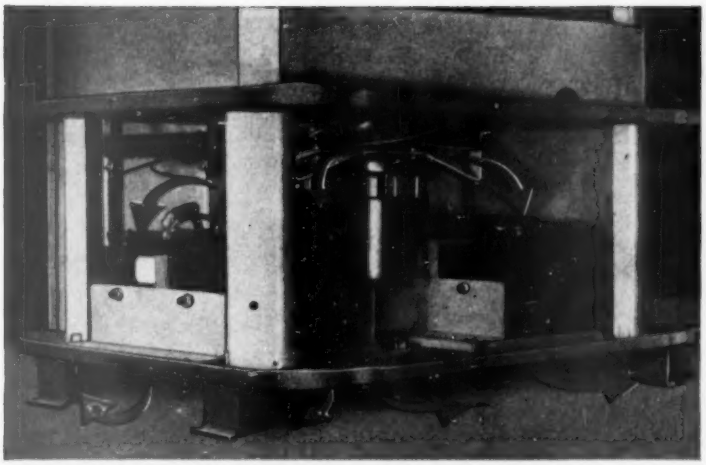
Quiet, low-cost operation, and low maintenance expense—these are just a few of the benefits you get with G.E.'s new rectifier welder. Its soft arc can be made penetrating at the flick of a switch.

Only G.E. offers full-time, arc-force control, to give you all the advantages of d-c welding. For more data on the exclusive features of this powerful rectifier welder, see the next page, and. . .

CONTACT YOUR G-E DISTRIBUTOR TODAY

Learn more about how you benefit from choosing from the complete G-E line—ask your distributor for free bulletins and information. His name is listed on the opposite page, and on the yellow pages of your phone book, under "Welding Equipment—General Electric." General Electric Co., Schenectady 5, N. Y.

(710-17)



REVERSE-DRAFT FAN becomes a dust blower at the flick of a switch. Rectifier stacks may be periodically cleaned in this way to prolong the life of the equipment.

New G-E rectifier welder offers unique money-saving features

General Electric's powerful new 400-amp rectifier welder provides you with two practical features you will not find in any other rectifier set: full-time arc-force control, and a reverse-draft fan.

FULL-TIME ARC-FORCE CONTROL

With G-E full-time arc-force control (optional equipment) you can hold a short arc on those extra-tough welding jobs with little chance for pop-outs or freezing in.

POWERFUL REVERSE-DRAFT FAN

A powerful ventilating fan in G-E rectifier welders can be reversed easily to blow dirt off rectifier stacks. This cleaning action minimizes a major cause of rectifier failures.

FOR MORE INFORMATION

See your G-E Welding Distributor for full details. His name is listed on this page and in the yellow pages of the phone book under "Welding Equipment—General Electric."

MEMO:

Ask about the three star-performers featured at the AWS Welding Show:

G-E RECTIFIER WELDER—the rectifier with the new features—aimed at long service with a minimum of interruptions in production.

G-E FILLERARC—for consumable-electrode, gas-shielded welding. The gun feeds wire by PULLING—allowing thinner wire for welding thinner sections.

G-E STRIKEASY 1—the new electrode with a powdered-iron coating. Boosts deposition rates so high you can save up to 35% in costs.

G-E WELDING DISTRIBUTORS

Alabama: Birmingham—Alabama Oxygen, Young & Vann Supply; Mobile—Turner Supply

Arizona: Phoenix—Consolidated Welding Supply

California: Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Francisco, Ventura—Victor Equipment

Colorado: Boulder, Colorado Springs, Denver, Durango, Ft. Collins, Ft. Morgan, Greeley, LaJunta, Longmont, Pueblo, Sterling—Hendrie & Bolthoff

Connecticut: Hartford, New Haven—Harris Company

Florida: Hollywood—Florida Gas & Chemical

Georgia: Atlanta, Macon—Welding Supply & Service; Augusta—Marks Oxygen; Columbus—Williams Welding Supplies

Idaho: Boise—Olson Manufacturing

Illinois: Chicago, Moline, Morton, Rockford—Machinery & Welder

Indiana: Evansville—Drillmaster Supply; Ft. Wayne, Indianapolis—Sutton-Garten; South Bend—Perry Welding Sales & Service

Iowa: Des Moines—Machinery & Welder

Kansas: Wichita—Standard Products

Kentucky: Louisville—Reliable Welding; Paducah—Henry A. Petter Supply

Louisiana: Alexandria, Shreveport—Hughes Oxygen; New Orleans—Consolidated Welding Supplies

Maryland: Baltimore—Arcway Equipment

Massachusetts: Boston—New England G-E Welding Sales Division

Michigan: Detroit—Welding Sales & Engineering; Grand Rapids—Miller Welding Supply

Minnesota: Duluth—W.P.&R.S. Mars; St. Paul—Production Materials

Mississippi: Jackson—Jackson Welding & Supply

Missouri: Kansas City—Hohenschild Welders Supply; St. Louis—Machinery & Welder

Montana: Billings—Valley Welders Supply; Billings, Bozeman, Cut Bank, Glasgow, Great Falls, Havre, Kalispell, Miles City, Shelby, Sidney, Whitefish—Valley Motor Supply; Butte, Great Falls—Montana Hardware

Nebraska: Lincoln—Lincoln Welding & Supply; Omaha—Baum Iron

New Jersey: Kenilworth—Welding Sales Corp.

New Mexico: Albuquerque—Industrial Supply Co.; Hobbs—Western Oxygen; Las Cruces, Silver City—Car Parts Depot, Inc.

New York: Buffalo—Welding Equipment Sales; New York—Welding Sales Corp.; Syracuse—Welding Engineering & Equip.

North Carolina: Charlotte—Dixie Gases; Gastonia—Gastonia Motor Parts

North Dakota: Bismarck, Fargo—Acme Welding Supply

Ohio: Akron, Cincinnati, Cleveland, Columbus, Dayton, Mansfield—Burdett Oxygen; Toledo—Odland Iron Works

Oklahoma: Oklahoma City—Hooper Supply

Oregon: Eugene, Portland—J. E. Haseltine; Medford, Portland—Industrial Air Products

Pennsylvania: Allentown, Philadelphia, Pittsburgh—Arcway Equipment

South Carolina: Columbia, Greenville—Welding Gas Products

South Dakota: Deadwood—Hendrie & Bolthoff

Tennessee: Chattanooga, Knoxville, Nashville—Welding Gas Products; Memphis—Delta Oxygen

Texas: Abilene—M&M Welding Supply; Alice, Corpus Christi—Crane Welding Supply; Alpine, El Paso, Marfa, Pecos—Car Parts Depot; Amarillo—Welding Equipment & Supply; Beaumont—H. & W. Welding Supply; Brownsville, Harlingen—Acetylene Oxygen; Dallas—Hill Equipment & Supply; Houston—G-E Welding Sales Division; Lubbock—Welders Supply of Lubbock; Midland—West Texas Welders Supply; Odessa, Pecos—Western Oxygen; Orange—Marine & Petroleum Supply; Pecos—Welding Supply Co.; Plainview—Plains Welding Supply; San Angelo—Southwestern Welding Supply; Texarkana—Hughes Oxygen; Wichita Falls—Nortex Welding Supply

Utah: Salt Lake City—The Galigher Co.

Washington: Seattle, Spokane—J. E. Haseltine; Spokane, Yakima—Industrial Air Products

West Virginia: Bluefield—Bluefield Supply; Charleston—Virginian Electric; Huntington, Logan—Logan Hardware & Supply

Wisconsin: Milwaukee—Machinery & Welder

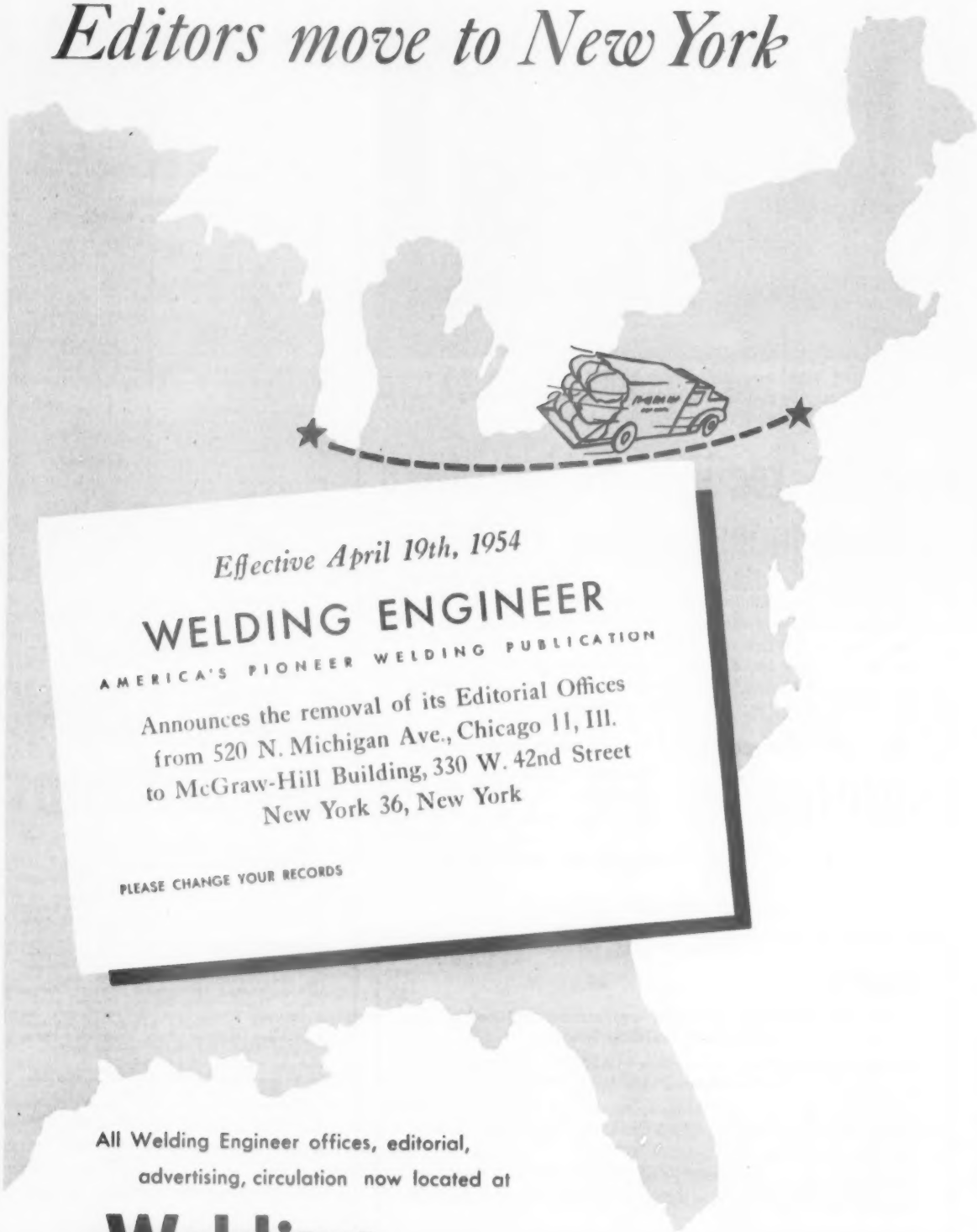
Alaska: Anchorage—Northern Supply

Canada: Toronto—Canadian G.E.

Hawaii: Honolulu—American Factors, Ltd.

GENERAL ELECTRIC

Editors move to New York



Effective April 19th, 1954

WELDING ENGINEER

AMERICA'S PIONEER WELDING PUBLICATION

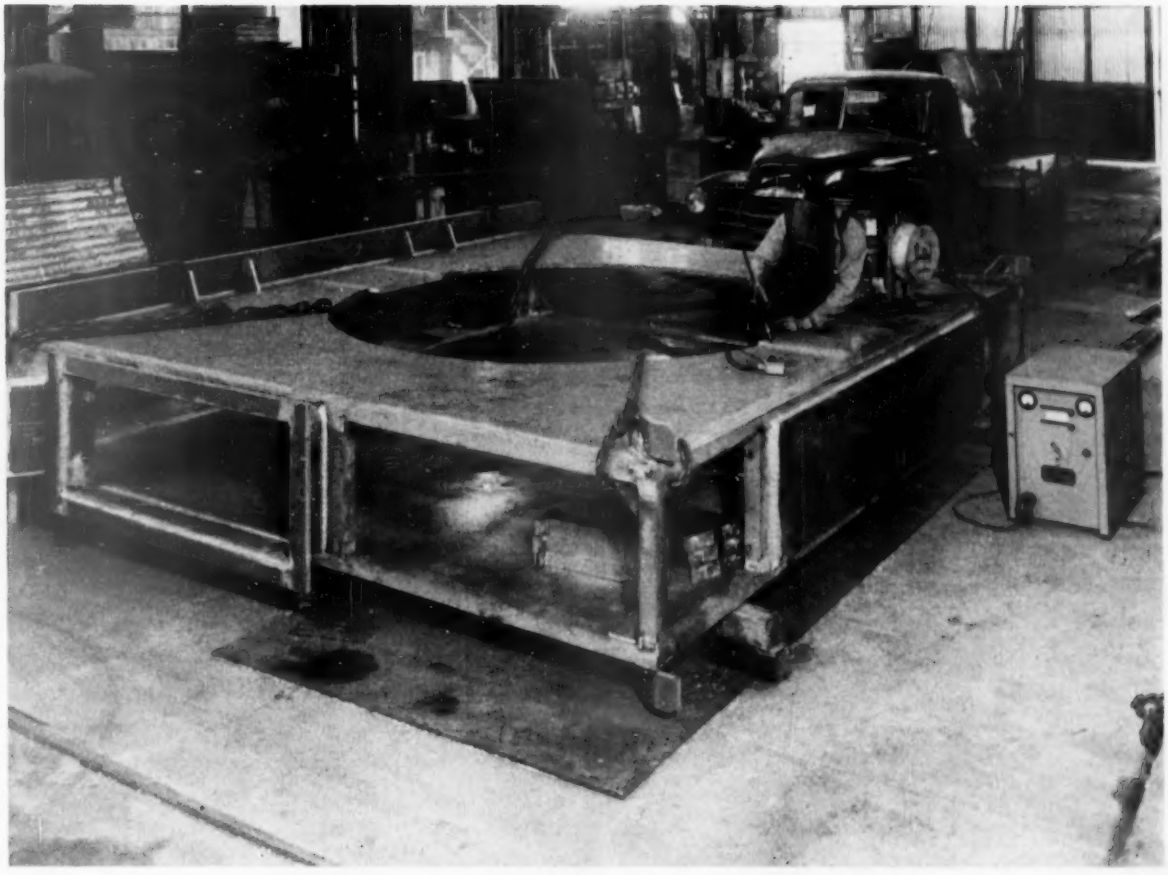
Announces the removal of its Editorial Offices
from 520 N. Michigan Ave., Chicago 11, Ill.
to McGraw-Hill Building, 330 W. 42nd Street
New York 36, New York

PLEASE CHANGE YOUR RECORDS

All Welding Engineer offices, editorial,
advertising, circulation now located at

Welding Engineer

330 WEST 42nd STREET, NEW YORK 36, N. Y.



Welding 1¼" aluminum plate with MIG process and Glenn CV Welder (at right). Constant voltage power source proved the most successful in qualification tests for vacuum-tight welds on this atomic research weldment.

Glenn Constant-Voltage Welders End Automatic Welding Control Problems

Glenn CV Welders are the original—and only—constant voltage power sources job-proved for more than a year on submerged arc, inert gas (MIG), "squirt" and automatic stud welding. They've licked tough problems on 3 o'clock and field welding jobs, on pipe mills, roundabout and long seam welds. They've simplified welding on aluminum, copper, stainless, mild and alloy steels.

How They Work

Glenn CV Welders deliver a fixed, pre-settable arc voltage that stays constant throughout the welding cycle... with no appreciable change even when tack welds or areas of poor fit-up are encountered.

No external voltage controls are needed. Current (amperage) is determined by rate of rod feed. Operation is simplicity itself; the welder merely presets the desired arc voltage, sets the correct feed rate on the feed roll motor, and starts the machine. Arc ignition and recovery are instantaneous; deposit and penetration stay steadily uniform because arc voltage and wire feed stay constant.

Complete Line

Glenn CV Welders are available in 3 models with continuous-duty ratings of 500, 750 and 1200 amperes, 18-42 volt arc voltages. They operate from 3-phase a.c. power supplies in all common line voltages. Efficiency is 85% or better, power factor 90% or better, at all settings. For comparable capacity, they cost less to buy, install, operate and maintain... and help you produce more and better welding.

Get the facts now. See us at Booth 98, AWS Show, Memorial Auditorium, Buffalo; or write today for literature and prices. Glenn Company, 3134 East 10th Street, Oakland 1, California, or 10222 Avenue N, Chicago 17.

SINCE 1929

ARC-SPOT miller GENERATORS WELDERS

25TH ANNIVERSARY

20% PLUS

INDUSTRIAL A.C. ARC WELDERS

. . . in a wide range of sizes for all A.C. welding problems, including four models specifically designed for submerged arc welding.

20% PLUS

"HELIARC"* A.C. ARC WELDERS

. . . built around famed Miller transformers for unexcelled arc stability and positive current adjustment. Complete control units available for even the most specialized application.

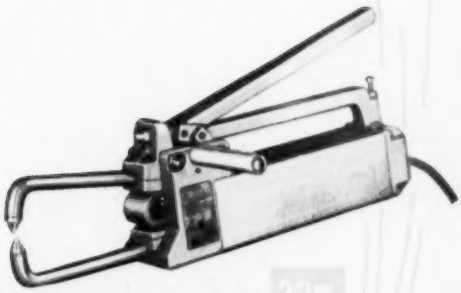
*The term "Heliarc" is a trademark of the Linde Air Products Co.

P.S.: See our new 25th Anniversary Model TA-252 at the Buffalo A.W.S. Show.

20% PLUS

SELENIUM RECTIFIER TYPE D.C. ARC WELDERS

. . . with patented "UNITRAN," which combines a Miller-built transformer with its own flux diverter. Purely electrical operation eliminates mechanical parts, slivers maintenance costs.



PORTABLE AND PEDESTAL SPOT WELDERS

20% PLUS

. . . in a variety of sizes and capacities. Portable models light enough to hold like any other hand power tool. Pedestal models foot or air actuated. Wide range of tongs and tips.

GASOLINE ENGINE DRIVEN ARC WELDERS AND POWER PLANTS

. . . powered by renowned Onan Engines, generator-coupled for greater efficiency. Both A.C. and D.C. welders available. A.C. models with or without integral electric power plant.

20% PLUS

GENERAL UTILITY A.C. ARC WELDERS

. . . in three models provide farms, shops and garages with efficient, high-quality, low-cost welding units. Built to NEMA standards. Operate off commercial power lines. Simple and easy to use.

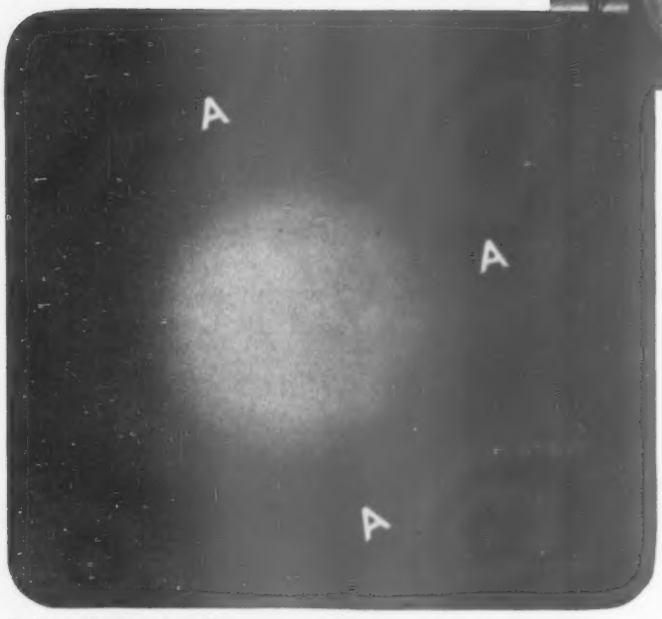
20% PLUS

20% Plus Factor

An engineer-earned designator for the basically better design, carefully built components, established efficiency and longer life of Miller Selenium Rectifier Type D.C., Sigma, Spot, Submerged Arc, A.C. Transformer, Special Purpose Welders, and Engine Driven combination Welder and Auxiliary Power Plants. Free, helpful literature sent on request.

miller

ELECTRIC MANUFACTURING COMPANY Inc. • Appleton, Wisconsin



Radiograph of repair weld

SAVED...

66⅔% in cost, 75% in time— because

RADIOGRAPHY proved welds sound

Cracks showed up in the shell of this stainless steel sphere. A new one would cost plenty—take priceless time.

But since radiography could prove welds sound and in conformance with code, stainless patches were welded in. The sphere went back to work in one fourth the time and at one third the cost of a new replacement. This is the way radiography helps extend the use of welding and widen opportunities for welders.

Wouldn't you like to know how it can help you increase your business? Get in touch with your x-ray dealer and talk it over.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography—
another important function of photography

Kodak
TRADE-MARK

Welding Info-Aids . . .

1 WELDING DATA—P. R. Mallory & Co. Resistance-welding catalog gives complete data on firm's electrodes, holders, rods and bars, dies, castings, forgings and accessories.

2 WELDING MOVIE—Eutectic Welding Alloys Corp. 4-page booklet describes film entitled "New Welding Procedures," recently released by this firm. The sound and full-color movie runs 19 minutes and explains welding rod and electrode techniques and procedures.

3 PIPE CUTTING—Contour Marker Corp. "The Contour Marker" is the title of 24-page booklet describing, and giving instructions on use of, device for marking pipe for cutting. Fully illustrated booklet also contains a table of tangents.

4 PLOW-SHARE WELDING—Wiese Plow Welding Co., Inc. 32-page illustrated catalog lists plow units and welding tools recommended for reclaiming them.

5 SALES BROCHURES—National Welding Equipment Co. 32-page pamphlet (Form CW 453-2), entitled "How to Clinch That Sale," explains roll played by illustrated brochures in helping to make sales.

6 SAFETY CLOTHING—Aljay Mfg. Co., Inc. Weldors' protective clothing is pictured and described in new catalog sheets. Shown are gloves, aprons, coats and accessories. Suggested prices are also included.

7 FIRST-AID KITS—E. D. Bullard Co. 16 different types and styles of "Safety Green" first-aid kits are shown in new catalog which also includes data sheet containing suggested units.

8 WELDING DATA—Marquette Mfg. Co., Inc. "Guide to Better Welding" is the title of booklet containing descriptions and specifications for firm's arc-welding electrodes, gas-welding rods and fluxes. Also includes recommendations for their use and instructions on welding procedures.

9 HOME-MADE WELDER—The Hobart Brothers Co. 48-page book, entitled "How to Build Your Own Gas Drive Welder," takes reader through step-by-step plans and ideas for the operator who wishes to build his own portable gas drive arc welder.

10 ESSAY CONTEST—The Pandjiris Weldment Co. 4-page booklet gives details of the essay contest on positioned welding. Cash prizes totaling $1,000 will be awarded for the best essays on how costs were cut, production increased or quality of product improved by application of positioning equipment. (News item concerning this contest was published on page 5 of WELDING ENGINEER for March.)

CARDS NOT GOOD AFTER AUGUST 1, 1954

11 FLAME CUTTING—Air Reduction Sales Co. "Advanced Automatic Flame-Cutting for Machinery Weldments" is the title of 12-page booklet, which is a reprint from *The Welding Journal*. It tells of the development and utilization of chain flame-cutting in the fabrication of weldments for power shovels.

12 LIGHTWEIGHT PIPE—Naylor Pipe Co. 4-page Bulletin No. 507 shows typical applications of firm's lightweight, lockseam-spiralweld pipe and fittings. Included are standard specifications on pipe from 4 to 30 in. in diameter and data on fabricated fittings, flanges and connections to meet all pipeline requirements.

TO OBTAIN: manufacturer's catalog or bulletin described on this page, use the card sections printed below. Insert number of the item or items that interest you. WELDING ENGINEER will ask manufacturers to send the information requested.

Each card section must be completely filled out. Do not use ditto marks. These cards are not good after Aug. 1, 1954.

How to obtain manufacturers' literature:

Fill out card section and write in number of item as shown at right:

Number → 23
Name John Smith
Company Rex Mfg. Co.
Address 3217 Lewis Ave., Chicago 16, Ill. Title Engineer
WELDING ENGINEER

Name.....
Company.....
Address.....
..... Title.....
MAY, 1954 WELDING ENGINEER

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Company.....
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WELDING ENGINEER, MAY, 1954

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WELDING ENGINEER, MAY, 1954

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WELDING ENGINEER

520 NORTH MICHIGAN AVE.

CHICAGO 11, ILL.

13 WELDING APPARATUS—National Welding Equipment Co. 36-page illustrated catalog lists welding and flame-cutting equipment, including torches, tips, nozzles etc. as well as complete outfits.

14 COPPER ELECTRODES—Ampco Metal, Inc. This firm is offering copies of the recently revised "Tentative Specifications for Copper and Copper-Alloy Welding Electrodes," ASTM designation B 225-53T, AWS designation A 5.6-53T. Specifications cover requirements, properties, standards, etc. for these electrodes for use in the metal-arc and inert-gas, consumable-electrode processes.

15 RESISTANCE WELDING—The Taylor-Winfield Corp. No. 541 of "Weld-It" describes two applications of firm's resistance-welding equipment—in the fabrication of tubs for automatic home laundries and refrigerator condensers.

16 PRESSURE VESSELS—Alloy Fabricators. Two summaries of ASME code for unfired pressure vessels are available in separate 4-page brochures. No. 1 condenses scope and general design conditions and gives details on allowable stresses and joint efficiency. No. 2 digests various formulas and computations required for designs of such vessels.

17 WELDOR'S VISE—Belmont Abrasives. 4-page booklet tells of "Grampus" vise for accurate welding of right angles. Vise sets mitered angle, channel, tee and H profiles, rounds, tubes and sections at right angles to each other. Heat from arc or flame does not affect shielded handle, which also serves as lock screw.

18 WELDING FIXTURE—Airline Welding and Engineering. 1-page leaflet pictures and describes new longitudinal welding fixture. Available in lengths from 2 to 12 ft. Hand welding and the automatic processes can be accomplished on this fixture.

19 ELECTRODE HOLDER—Duro Engineering Co. 4-page pamphlet announces new addition to line of electrode holders. Called the "Duro-Lite," it weighs but 16 oz and takes electrodes from 1/16 to ¼ in. in diameter. Folder also pictures five other models in the Duro line.

20 IMPACT TESTS—The International Nickel Co., Inc. 2-page Bulletin A-165 gives data on impact tests of welded austenitic stainless steels. Tested were weld metals the composition of which conformed to AISI types 301, 302, 304, 308, 310, 316, 317, 318 and 347. Reprinted from *The Welding Journal.*

21 CONTACT ELECTRODE — Air Reduction Sales Co. Bulletin ADC 650 gives details of "Easyarc 12," new electrode for use in welding mild steel. Welding speed is said to be doubled because welds can be made by dragging the electrode in contact with the plate.

22 PIPE-CUTTING PANTOGRAPH—Vernon Tool Co., Ltd. Bulletin No. P-2 tells of pantograph for speeding pipe fabrication work. This semiautomatic guided torch machine produces straight or beveled pipe cuts, saddle and insert-type tee intersections, lateral intersections and miters.

23 RADIOGRAPHY—Du Pont Co. "Du Pont Products for Industrial Radiography" is 28-page, 3-color booklet that provides exposure and processing data for each of the company's films used in industrial radiography.

24 STAINLESS STEELS—The Cooper Alloy Foundry Co. Alloy reference chart lists chemical analyses, physical properties and recommended applications for 28 grades of cast stainless steel. This 4-page chart also includes data concerning weldability and heat treatment.

25 WELDMENTS—American Car and Foundry Co. "Forging Ahead" is 26-page booklet that gives story of complete industrial forging service. Included is section on use of flash welders in joining components of sectional forgings.

26 SELENIUM RECTIFIER — International Rectifier Corp. Bulletin C-349 describes and gives specifications of power selenium rectifiers. Manufacturer states they have power factor of 95%, ratings to 250 kw and efficiency to 87%.

27 WELDING CABLE—Uniflex Cable Division, United Metal Craft Co. Illustrated leaflet pictures and describes firm's "kickless" cable, which is said to cut resistance-welding cable costs 56%.

28 WELDING FIXTURE—Erico Products, Inc. 2-page illustrated leaflet describes new "Caddy L-145" bench fixture for use in welding cable connections. Fixture includes mold-cover assembly, mold, mold handle, clamps and adjustable platform.

29 GRINDING IDLER—The Carborundum Co. 4-page color brochure A-1262 describes the "61 Universal" idler for all types of coated abrasive backstand grinding and polishing operations. Idler permits belts of same lengths to be used with contact wheels of various diameters.

30 RESEARCH — Illinois Institute of Technology. New booklet, entitled "Scientific Sleuthing," describes Armour Research Foundation's expanded literature research services available to industry. This literature research section offers technical, patent and economic surveys; surveillance of current technical information; bibliographies, abstracts and translations.

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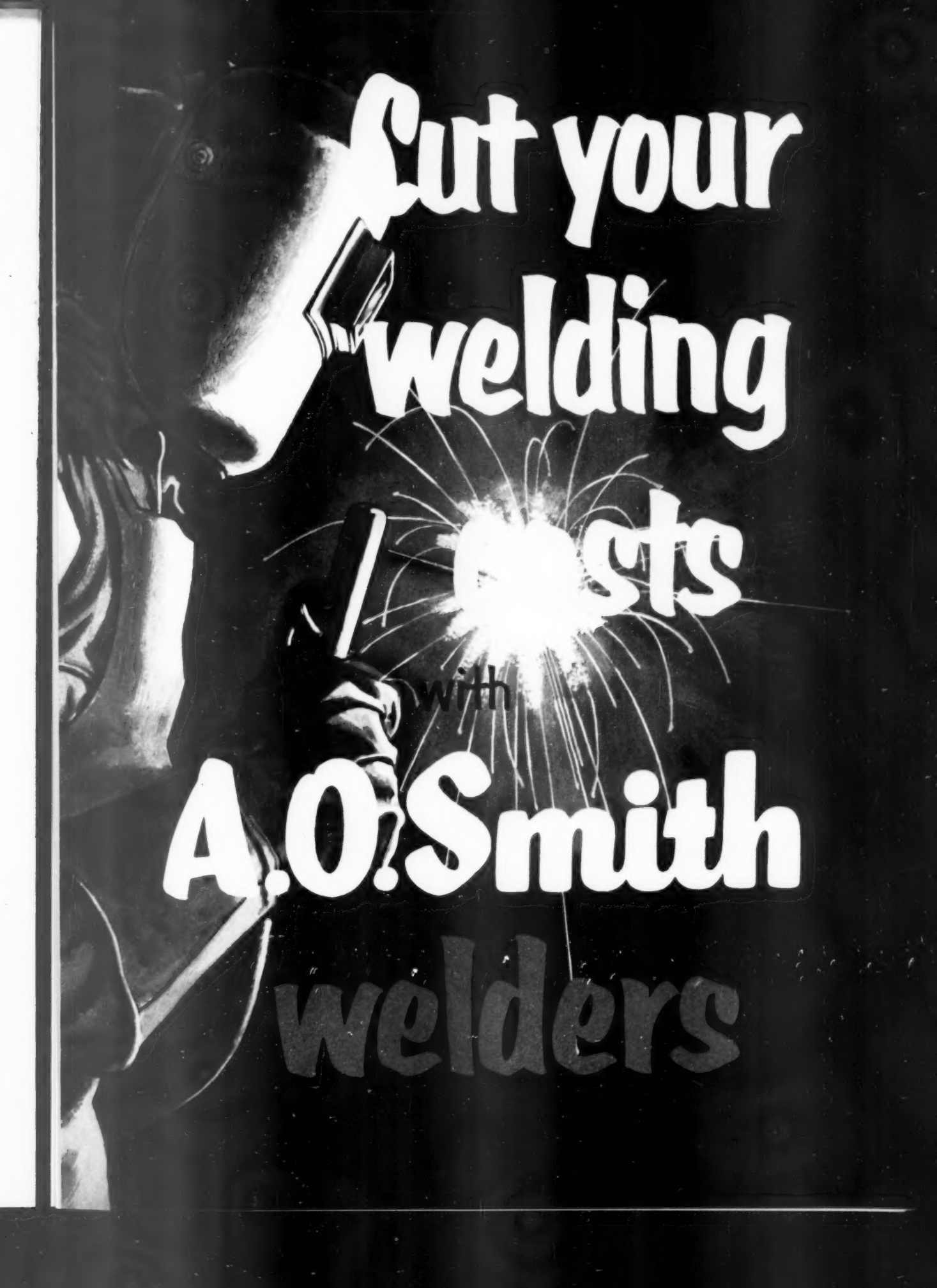

Cut your
welding
costs
with
A.O.Smith
welders

...and get all the

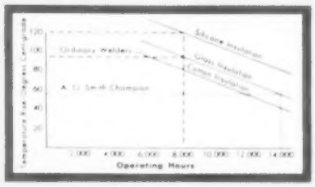
A. C. CHAMPION

heavy-duty welder

Designed and long proved the most dependable power source for continuous operation on the most demanding welding assignments at full rated output.

The CHAMPION has enough copper, plus downdraft ventilation, to assure no more than a 55° C. temperature rise when operating at full rated output. This means almost twice the operating life of any comparable heavy-duty welder!

75 open circuit volts for high-speed welding with a faster and smoother arc! You can "drag the arc" on rapid work and weld low-hydrogen electrodes without "pop-outs." All-weather case makes it as useful outside as in the shop. Available in 300-, 400- and 500-amp models.



The **A. C. UTILITY** for farms, garages, machine shops with dual welding range: 25-90 amps., 35-180 amps

extra benefits

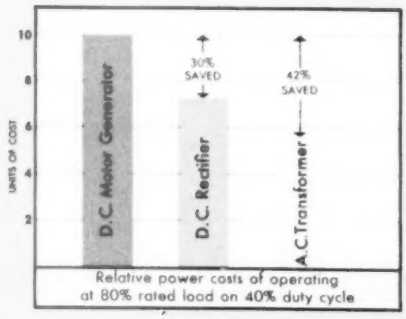
which A. O. Smith design and engineering provide!

D. C.
RECTIFIER
heavy-duty welder

Here is a complete line of N.E.M.A.-rated welding power sources that operate without a single, heavy, rotating part! No motor (other than ventilating fan) and no generator . . . nothing to wear, no commutators to corrode or turn down, no bearings or brushes to replace! Yet they provide a better welding current for all types of work, and operate with unmatched efficiency!

SAVE POWER

Power costs of operating 400-amp. welders are charted below, providing an opportunity to compare motor-generator, rectifier, and AC transformer demands on 40% duty cycle.



Relative power costs of operating at 80% rated load on 40% duty cycle

The savings in power effected by transformer type machines over motor generators result from the improved efficiency under load of the A. C. transformer (85% to 88%) and the D. C. Rectifier (69% to 72%) over the D. C. Motor Generator (45% to 50%), plus the ability of transformer and rectifier to deliver full welding current instantly, when demanded, without requiring large idle-time power to keep rotating parts in motion. The savings are real. In fact, many manufacturers have found that a new transformer will practically pay for itself in a year! Ask your A. O. Smith distributor or representative to show you how, at your next opportunity.

SAVE OTHER COSTS

You save more than power costs when M.G. sets are replaced by A. O. Smith welding machines. Rectifier and transformer welding current inherently has less arc blow, and that means higher quality welds, faster welding speeds and less spatter. It also means greater overall operator efficiency, which assures better weldments, less weld repair and gives the operator greater pride in his work. The result: more money saved and production improved!

Because there are no moving parts, A. O. Smith welders require practically no maintenance. Quiet in operation, they are built to stand up under gruelling production schedules.

Modern successor to the cumbersome, troublesome, lumbering motor-generator set! This welding power source provides smoother arc performance, more dependable amperage at all times, instant striking arcs, and uses power only when welding! It's the only rectifier-type welder designed with high-velocity down-draft ventilation, which draws cool air in over the rectifier stacks before blasting it through the machine. Even when short-circuited at full rated amperage setting, the rectifier stacks remain below critical temperature! Stepless amperage control, effortless and accurate over the full range, assures exactly the desired setting for any job. The three-phase transformer coils are precision wound, of heavy copper, for long service life. Available in 200-, 300- and 400-amp. models.

The A. C. CHALLENGER all-purpose welder 200-, 300- and 400-amp. models

The A. C. AUTO-MAN for automatic or manual use 650-amp. model, up to 4-unit multiples available

There are A. O. Smith welding power sources for every welding need, built to the highest standards in the industry and of advanced design that makes them more desirable than any other make. Job proved in the shops of the world's largest user of welding as a production tool!

It will pay you to replace M.G. sets with A. O. Smith welders. May we suggest that you write us or contact your local A. O. Smith distributor for full particulars.

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION, Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

Highest Quality Welding Electrodes

Mild Steel	AWS Class	E6010	E6011	E6012	E6012	E6013	E6013	E6020
	A. O. Smith	SW10	SW14	SW11	SW17	SW18	SW16	SW35

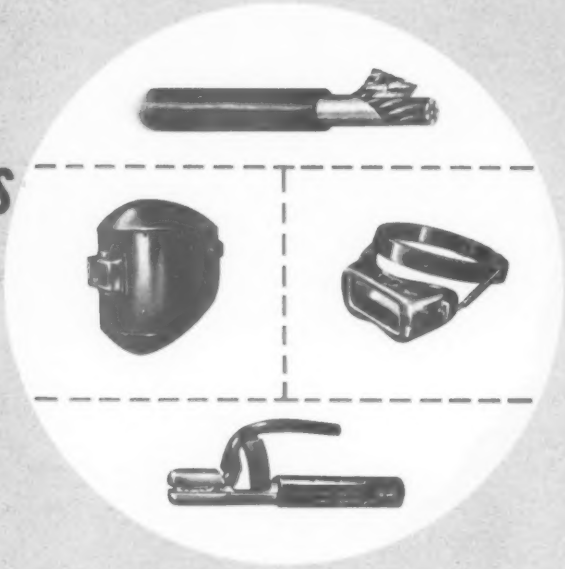
High Tensile	AWS Class	E7010	E7010	E7020	E8013	E9010	E9013	E10D13	E10020
	A. O. Smith	SW75	SW80	SW76	SW86	SW95	SW87	SW88	SW101

Low Hydrogen	AWS Class	E6016	E6016	E7016	E8016	E9016	E9016	E10016	E12015	E12016
	A. O. Smith	SW64	SW65	SW84	SW91	SW90	SW89	SW100	SW120	SW103

Stainless	AISI Class	303	305	410	430	308	308	309	309	310	310	310	310	310	316	317	318	347	347
	A. O. Smith	SW151	SW152	SW153	SW154	SW162	SW362	SW166	SW167	SW159	SW309	SW169	SW168	SW368	SW160	SW161	SW158	SW157	SW357

Complete line of welding accessories

All the essentials to put welding to work are available through A. O. Smith. Quality welding cable, connectors, splicers, ground clamps, tongs, and holders; helmets, shields, gloves, and protective clothing; electrode storage ovens, machines and electrodes ... everything required for welding can be had from one responsible source. Take advantage of this for all your welding needs.



A.O.Smith CORPORATION

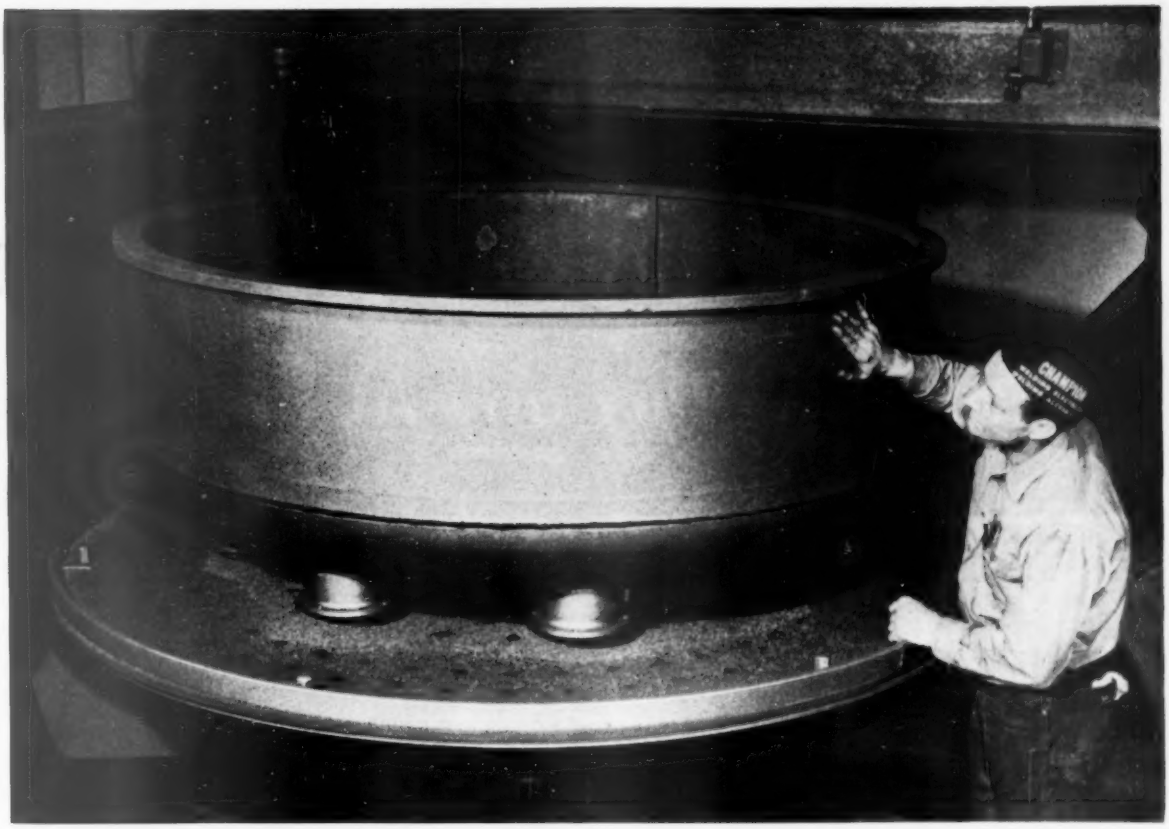
WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

Made by welders . . . for welders

pioneering developments keep WHEELABRATOR® first in blast cleaning



Cleaning Weldments with the Airless Wheelabrator Effected These 9 Bonus Benefits

1. Reduced manpower needs 50%
2. Cut compressed air costs
3. Slashed grinding wheel cost
4. Improved weld quality
5. Reduced leaks in pressure-tight vessels
6. Improved working conditions
7. Eliminated grinding dust problem
8. Cleaned pieces formerly too costly to clean
9. Improved production flow in welding shop

McNeil Machine & Engineering Co., Akron, Ohio, realized these nine bonus benefits in its weldment cleaning department when it switched to Wheelabrator Airless Blast Cleaning. Hand grinding and chipping were replaced for removing scale, welding flux and slag from their fabricated members ranging in size from very small items to large pressure domes weighing 1500 lbs. (as illustrated above).

Six men were formerly required with these manual operations — three do the job now. Cleaning time also has been slashed — in the case of the pressure domes, for example, from 90 minutes to only 10.

There's a great deal more to this Wheelabrator case history that should be of great interest to all weldment producers who are depending upon time-consuming manual methods for weldment cleaning. The complete story will be sent upon request. Ask for Production Economizer No. 2 and for details on how the Wheelabrator can save time, money and man-hours for you, too.

Bulletin 74-B tells "What the Wheelabrator is and What It Will Do For You." Send for your copy, today.

American
WHEELABRATOR & EQUIPMENT CORP.
857 S. Byrkit St., Mishawaka, Ind.

Wheelabrator®
AIRLESS BLAST CLEANING

CHECK LINCOLN'S NEW LOW PRICES

before you buy any AC welder

FLEETWELDER

...prices reduced 11% to 24%

Fleetwelder AC *with Arc-Booster. 300, 400, 500 amp sizes. For wide range of light and heavy welding with AC.*

FLEETWELDER SPECIAL

...new *low-priced* AC welder

Fleetwelder Special. *300, 400, 500 amp sizes. More useable amps* per dollar *than any AC welder.*

LOWEST COST AC WELDING

Lincoln's new combination of lower AC machine prices and faster welding with Jetweld heralds another development in Lincoln's program to lower welding costs.

The highest manual AC welding speeds ever attained are now available to industry . . . and at lowest possible cost because:

1. Lincoln AC machine prices are lowered 11% to 24% . . . *and more with the new Fleetwelder Special.*

2. 35% and higher welding speeds can now be realized with Jetwelding . . . using the cost-cutting combination of Jetweld and Lincoln AC power.

WRITE FOR PRICES

— Benefit Now. Have your Lincoln representative check your requirements for both electrodes and welders. Call or write.

THE LINCOLN ELECTRIC COMPANY

DEPT. 1704 • CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

ESTABLISHED 1916

WELDING ENGINEER

MAY, 1954

The leopards are whitewashing

As THE story goes, an old Quaker was seated across the table from his wife. "Matilda," he said, "I think everybody but me and thee be crazy—and sometimes I have my doubts about thee."

Perhaps Matilda had started to parrot the thoughts of some of our present do-gooders with axes to grind. In Illinois, for instance, we have a senator running for re-election who says that his only important mission in life is to save the country from "a serious depression." But his dire predictions of calamity are scaring Matilda and other timid souls like her nearly to death. And scared people stop spending and stick their money away in safety deposit boxes. So our senator is helping to bring on the very thing that he says he is fighting.

The real pay-off, however, is that he is telling everybody that the country is on the brink of a depression because 3,700,000 persons are unemployed. In 1948, however, nearly 5,000,000 persons were out of work, and that same senator was telling us we never had it so good. His party was running things then.

"Can the leopard change his spots, or the Ethiopian his skin?" Today this age-old query would receive a different answer. The Ethiopian and the leopard not only can but must if they belong to an out-of-power political party. Yes, leopards are whitewashing.

To CITE another example, Leon Keyserling, who was President Truman's principal economic advisor, is now advocating exactly the opposite of what he expressed in his report to the President in January, 1950. At that time, he felt that the "recuperative powers" of the country would get the people back to work. Now—with two million more persons working and 25% less unemployed—Keyserling wants increased spending, an expanded deficit and further cuts in taxes. What's wrong with our recuperative powers now?

A week or so ago the mail brought me a 60-page document bearing the impressive title, "Defense Against Recession: A Policy for Greater Economic Stability." This publication is a report by the Committee for Economic Development, which used to promote sound business principles. Now it is advocating such remedies as the expansion of the supply of money and credit through the Federal Reserve System, loans to state and local governments to finance public construction and advances from the Federal Treasury to state unemployment funds.

Get your hats on, kids; this show we've seen before! Back in the 1930's the New Deal adopted the very same remedies for economic adversity. And the cure-alls failed to cure them.

What we seem to lack in this country are leaders with thorough knowledge of what has happened before and how past conditions are repeating themselves in present-day problems. As one example of how a little such background can help in diagnosing economic conditions, I cite the steel production index. It shows steel mills operating at around 75% capacity. What this percentage figure fails to tell, however, is that steelmaking capacity has been so expanded during the past few years that 75% of present capacity is equivalent to 104% of capacity five years ago.

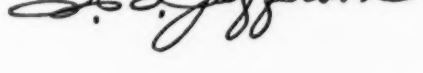
Electrode production for the first month of this year was two-thirds of what it was in 1953. Even so, I get reports from many welding distributors that their 1954 sales are better than those of 1953. The reason why manufacturers aren't doing any better may be that distributors' inventories have been cut to the bone.

The fact that distributors' inventories have been so cut is evidenced by the number of telegrams that manufacturers are receiving for rush shipments. And manufacturers have apparently cut inventories, too. Even though sales are off, it is still often difficult to get a stock shipment from a manufacturer.

As an English dramatist* once said, "Clocks will go as they are set; but man, irregular man, is never constant, never certain."

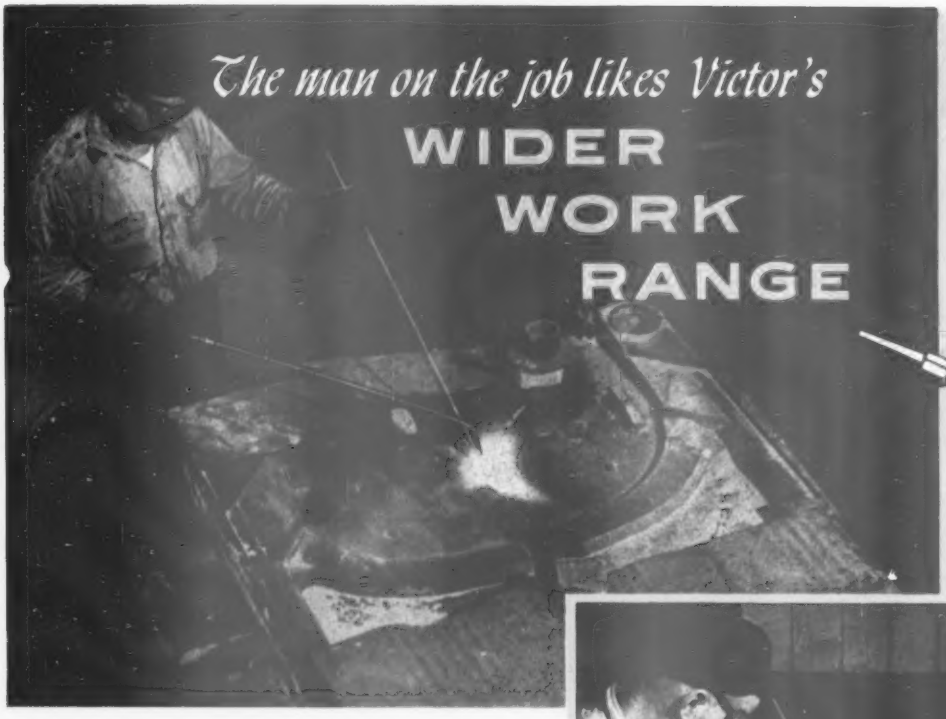
Maybe the old Quaker was right.

*Thomas Otway (1651-85).



The man on the job likes Victor's

WIDER WORK RANGE



Using a VICTOR No. 310 torch butt with two S2 extensions and No. 8 type 4 tip, Joe Wyman (Shreve Welding Co., Oakland, Calif.) repairs cast iron heating boiler header with VICTOR No. 1 low fuming manganese bronze rod. Inset photo shows 5/64" build-up on undersize castings, done with same No. 310 torch but with No. 5 type 4 nozzle and VICTOR No. 6 square cast iron rod.

VICTOR'S wider work range pays off from the day you select your first VICTOR welding outfit on through a lifetime of reliable service. You buy the torch you need for your present work, add extensions, cutting attachments or special nozzles as they're needed. Result: top-quality equipment that's always perfectly matched to your needs!

Whatever the job . . . welding, cutting, heating, brazing, descaling . . . you'll start it quicker, finish it sooner with versatile VICTOR equipment!

VICTOR for welding

LOOK FOR THE VICTOR DEALER SIGN *. . . ask him to show you why it costs less to own and operate VICTOR.*

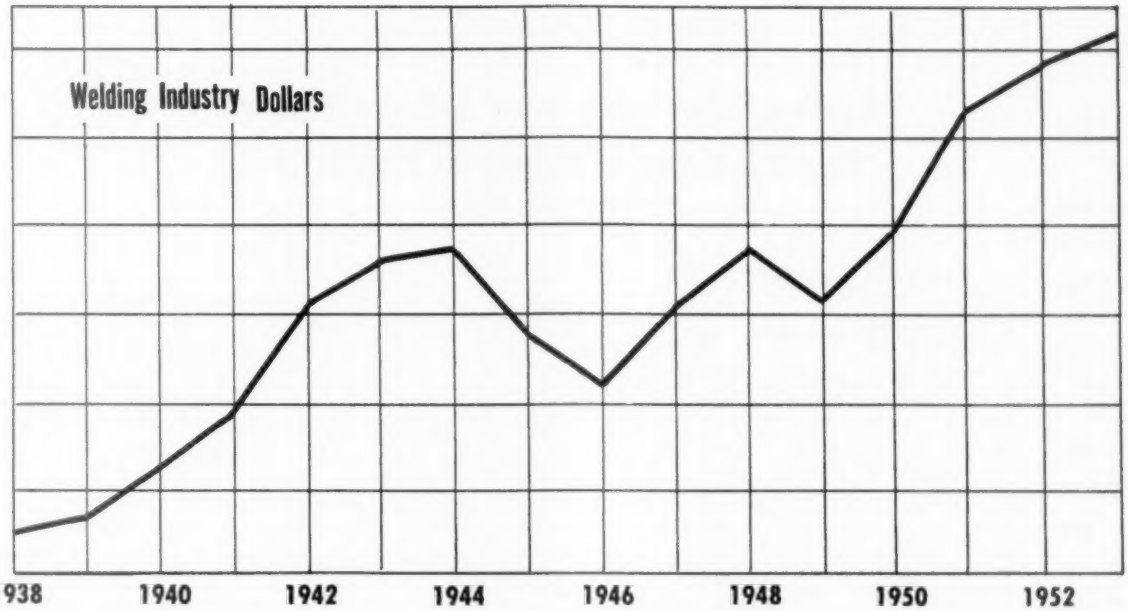
VICTOR EQUIPMENT COMPANY

10

Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles.

3821 Santa Fe Ave.
LOS ANGELES 58

844 Folsom Street
SAN FRANCISCO 7



1938	$ 58,138,734	1942	309,236,609	1946	223,794,265	1950	392,386,641
1939	72,682,502	1943	360,658,667	1947	306,974,378	1951	532,487,722
1940	124,091,220	1944	371,545,428	1948	255,392,227	1952	586,230,765
1941	190,842,728	1945	278,300,118	1949	320,869,119	1953	613,758,135

How welding sales have climbed!

The demand for welding has been continually on the increase since the early stages of World War II. Every year more fabricators join the Big Parade as they learn of the advantages of this "magic joining" process.

BY T. B. JEFFERSON

IN 1953 over $613,000,000 were spent for welding equipment, supplies and gases. For the third consecutive year, welding sales exceeded the one-half billion dollar mark, and for the first time the total was over $600,000,000. This expenditure for welding was used in producing products that had a sales value of over $100,000,000,000.

Look at the Curve

The sale of welding equipment, supplies and accessories in 1953 represented a mere 5% increase over 1952. The total, however, was 10½ times the 1938 sales, five times the 1940 sales and double the 1947 sales. Table above illustrates vividly the manner in which the welding industry has grown during the past 15 years.

Every year finds more applications of welding than the previous year. In fact, the use of welding has become so important that the plants of many industries are wholly dependent upon it. Without the welding process these plants would find it necessary to revamp their entire production set-up.

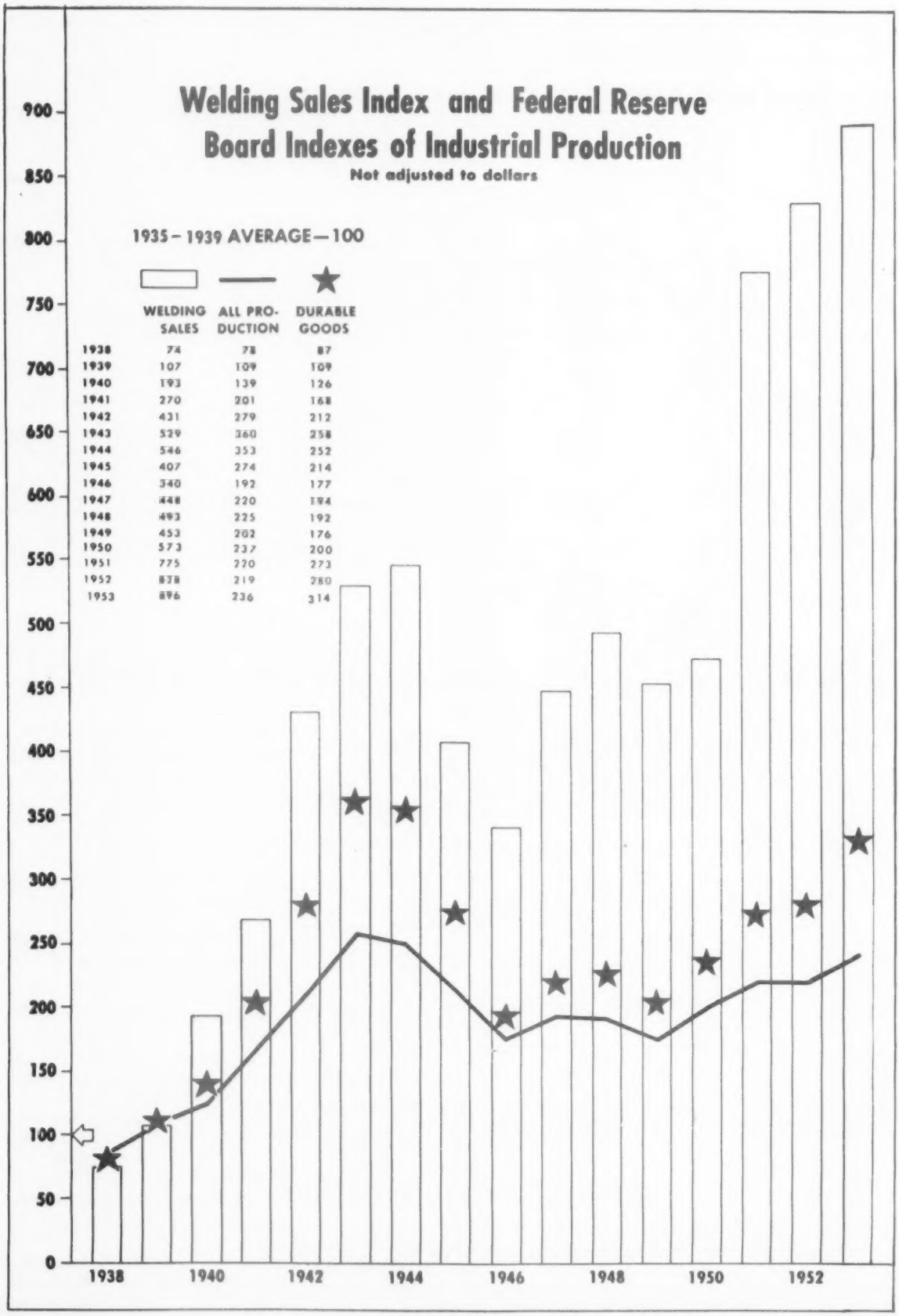
In those industries where welding is not used for production, it has been found to be a valuable means of maintaining equipment. Since manufacturers and processors are finding it advantageous to repair rather than renew their equipment, welding uses for maintenance have likewise been expanded.

During the past year the use of welding in construction has made great gains. It was not unusual for the bidder on a structural steel job to find that an alternate process to riveting would be considered. In a great many such cases, welded fabrication was chosen because of its lower cost and saving in steel. Welded highway bridges are becoming commonplace. A majority of the bridges built for highways last year were fabricated by welding.

Big Year for Gases

Of the three major divisions in the welding field, the major expenditures were in gas welding because the sale of welding gases is included in this market category. The sales of oxygen and acetylene totaled nearly $370,000,000 in 1953 and reached an all-time high. The value of these gases was approximately 60% of the total welding sales last year.

The sale of oxygen last year was just double the 1947 figure and represented a 2,500% increase over


Welding Sales Index and Federal Reserve Board Indexes of Industrial Production
Not adjusted to dollars
1935 – 1939 AVERAGE – 100
WELDING SALES
ALL PRODUCTION
DURABLE GOODS
1938 74 78 87
1939 107 109 109
1940 193 139 126
1941 270 201 168
1942 431 279 212
1943 529 360 258
1944 546 353 252
1945 407 274 214
1946 340 192 177
1947 448 220 194
1948 493 225 192
1949 453 202 176
1950 573 237 200
1951 775 220 273
1952 838 219 280
1953 896 236 314
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
1938
1940
1942
1944
1946
1948
1950
1952

oxygen sales in 1919. Acetylene sales were up nearly 2,000% over the 1919 figure and nearly double the 1946 sales. More about welding gases later.

Steel-Welding Relation

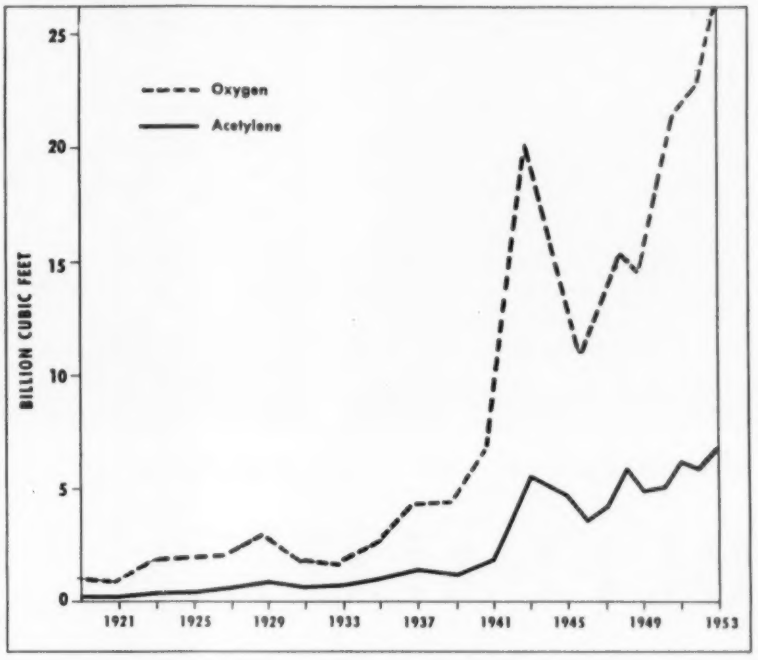
Last year set a record for steel production. A total of 111,609,719 tons of steel ingots were produced. The tonnage of plates, shapes and sheets also climbed, surpassing the 1952 total by over 1,500,000 tons. The total production of plates, shapes and sheets was 26,889,093 tons.

On the basis of dollars spent for welding compared to tons of plates, shapes and sheets produced, the welding market reached an all-time high in 1953. The-dollar-per-ton figure was $22.80. When welding is compared with steel ingots, $5.59 was spent on welding for each ton of steel ingots produced.

Electrode production figures, however, were down somewhat when pounds of electrodes produced are compared per ton of steel. For every ton of plates, shapes and sheets turned out by the steel mills, 20.4 lb of electrodes were produced. This represents a drop of over 2 lb per ton from the comparison of the previous year. When compared to steel ingots, the electrode production was 4.94 lb per ton.

Electrode production in 1953, though the lowest of the last three years in ratio to steel, exceeded half a billion pounds for the third year in a row. That is no little figure. Total production of electrodes for manual and automatic welding, including all types of materials for these purposes, was 547,614,604 lb. Welding wire production for the year, including both electrodes and wire for gas welding, totaled 580,223,145 lb.

Welding Gases Production.... 1920–1953



Climbed three times as fast

WELDING sales index for 1953 stood at 896, a gain of 68 points over 1952. These figures are based on an index established at 100% on the average of 1935-39 average sales. The Federal Reserve Board Index estimates for industrial production, based on the same average period, indicated an overall production figure of 236 and a durable goods figure of 314. These indices show that welding sales are climbing nearly three times as fast as the overall industrial production picture.

Arc Welding

Excluding welding gases, the major market of the welding industry is represented by arc welding. The arc-welding branch of our industry was a $157,600,000 market in 1953. As follows:

Welding machines	$ 36,800,000
Electrodes	104,800,000
Accessories	16,000,000

An important trend is continuing in arc welding. More and more the emphasis is away from manual welding and toward automatic and semiautomatic methods.

Hand welding will always be important, but higher labor costs are making it imperative that automatic applications be used. As competition becomes more intense, an even further use of the automatic welding process and new applications will become evident.

The use of inert gases in Mig (metal inert-gas) and Tig (tungsten inert-gas) expanded rapidly during the year. These comparatively new processes have now been developed to such an extent that nearly all metals can be joined by them. Their use has been expanded to include hardfacing in the field of maintenance welding.

Another automatic welding development having an impact on the welding market is the use of multiple electrodes in submerged-arc welding. This is materially speeding up an already high-speed process. Semiautomatic welding methods also found a wider use during the year. We predict that the use of semiautomatic equipment will be increased even further in 1954 with the introduction of the new magnetic flux method of welding.

More Gas Than Ever

The year 1953 saw the greatest production of welding gases in the history of our country. Over 25 billion cu ft of oxygen valued at nearly $230,000,000 and 6,500,000,000 cu ft of acetylene valued at $139,000,000 were produced in some 209 gas plants around the country. The total dollar volume of the gases exceeded 1952 figures by nearly 15%.

The dollar sales of equipment for use in the gas welding field were off about 8% in 1953. The total sales for gas welding equipment were $29,986,440. The total of gas welding accessories and rod sales were

(Continued on page 48)

Meetings • Exhibits

BUFFALO ..... this month

With 39 papers and 13 technical sessions in the offing, the national spring meeting of the American Welding Society is looming up as a truly big-league affair.

BY CLYDE B. CLASON

BEING held concurrently with the second Welding and Allied Industry Exposition in Buffalo during the first week of May, the American Welding Society's national spring meeting gives every promise of being a worthy successor to the successful Houston meeting of last June.

The welding show will be at the Buffalo Memorial Auditorium, indicated by the right arrow on the above photograph of downtown Buffalo. The technical meetings will be at the Hotel Statler, indicated by the left arrow and shown in left photograph. There should be little difficulty in getting from one of these buildings to the other.

The Welding Show is to be a three-day affair, running from Wednesday May 5 through Friday May 7. The technical meeting is scheduled to run for four days, beginning at 2 p.m. on Tuesday afternoon May 4. There will be simultaneous technical sessions on Tuesday afternoon, Wednesday morning, Wednesday afternoon, Thursday morning and Friday morning. Thursday and Friday afternoons are left vacant for visits to the show.

Program for the meetings was slated to include sessions on weldability, inert-gas welding, resistance welding, stainless steel, hardfacing and metallizing, pressure vessels (with a paper on penstocks being included among them), titanium, structural welding, welding processes and equipment, non-ferrous metals, piping and tubing, and a 13th (we hope not unlucky) session on applications.

Some of the papers which seem to hold promise of interest are:

Mig welding of carbon steel, Tuesday afternoon. J. R. Craig, Linde Air Products Co.

Tig spot welding, Tuesday afternoon. C. A. McClean, Air Reduction Sales Co.

Flash welding of copper to aluminum tubing, Wednesday morning. W. F. Haessly, Taylor-Winfield Corp.

Spot welding of thin-gage aluminum alloys, Wednesday morning, I. W. Johnson, General Electric Co.

Series spot welding of auto-body steel, Wednesday afternoon. E. F. Nippes and F. H. Domina, Rensselaer Polytechnic Institute.

Standards for RWMA type A-1 transformers, Wednesday afternoon. J. F. Deffenbaugh, F. E. Murray and V. A. Rathfelder, Federal Machine and Welder Co.

Performance of modified type 347 weld metals in qualification tests, Wednesday morning. L. K. Poole and R. D. Thomas, Jr., Arcos Corp.

Improved semiautomatic welding and hardfacing, Wednesday morning. Howard S. Avery, T. G. Brashear, H. J. Chapin and G. H. Edmunds, American Brake Shoe Co.

Manual guided submerged-arc welding, Thursday morning. R. A. Kubli, Linde Air Products Co.

D-c arc welders—rectifiers or motor generator sets? Thursday morning. S. Oestreicher, Harnischfeger Corp.

Selection of d-c arc-welding power sources, Thursday morning. A. U. Welch, General Electric Co.

Brazing molybdenum for high-temperature service, Friday morning. M. I. Jacobson, D. C. Martin and C. B. Voldrich, Battelle Memorial Institute.

Welding of 90-10 copper-nickel alloy, Friday morning. G. R. Pease and T. E. Kihlgren, International Nickel Co., Inc.

Adhesive bonding, Friday morning. Henry H. Simons, Eutectic Welding Alloys Corp.

Powdered-metal electrodes and their application, Friday morning. R. C. Shutt, The Lincoln Electric Co.

...among the exhibitors

A

Acetogen Gas Co., Detroit. Booth 43.

Air Reduction Sales Co., New York City. Booths 26-32.

Alloy Rods Co., York, Pa. Booths 165-169.

All-State Welding Alloys Co., Inc., White Plains, N. Y. Booth 63.

Alpha Metals, Inc., Jersey City. Booth 101.

Aluminum Co. of America, Pittsburgh. Booths 121-123.

American Brass Co., The, Waterbury, Conn. Booths 46-47.

American Chain & Cable Co., Inc., Bridgeport, Conn. Booth 150.

American Manganese Steel Division, Chicago Heights, Ill. Booths 107-109.

American Platinum Works, The, Newark. Booths 148-149.

Ames Spot Welder Co., Inc., Brooklyn. Booth 120.

Ampco Metal, Inc., Milwaukee. Booths 174-175.

Ampower Products Co. & Ross Machine Tool Co., Oak Lawn, Ill. Booth 128.

Andco, Inc., Orchard Park, N. Y. Booth 82.

Andreasen, Inc., Holger, San Francisco. Booths 170-171.

Arcos Corp., Philadelphia. Booths 141-142.

Aronson Machine Co., Arcade, N. Y. Booth 83.

B

Bay State Abrasive Products Co., Westboro, Mass. Booths 130-131.

Bernard Welding Equipment Co., Chicago. Booths 162-163.

Burdett Oxygen Co., The, & American Industrial Safety Equipment Co., Cleveland. Booth 110.

C

Cam-Lok Division, Empire Products, Inc., Cincinnati. Booth 146.

Cayuga Machine & Fabricating Co., Inc., Depew, N. Y. Booth 23.

Champion Rivet Co., The, Cleveland. Booths 61-62.

Coast Metals, Inc., Little Ferry, N. J. Booths 136-138.

Contour Marker Corp. of California, Compton, Calif. Booths 10-11.

Coyne Sales Co., San Francisco. Booth 93.

D

Dockson Corp., Detroit. Booth 164.

Duro-Dyne Corp., New Hyde Park, L. I., N. Y. Booth 118.

Dyer Weld Corp., Kansas City, Mo. Booth 90.

E

Eutectic Welding Alloys Corp., Flushing, N. Y. Booths 1-3.

F

Federal Machine and Welder Co., The, Warren, Ohio. Booths 172-173.

Ferrotherm Co., Cleveland. Booth 78.

Frommelt Industries, Dubuque, Iowa. Booth 113.

G

Gamma Industries, Inc., Baton Rouge, La. Booth 102.

General Electric Co., Schenectady, N. Y. Booths 52-55.

Glenn Co., Oakland, Calif. Booth 98.

Goldsmith Brothers Smelting & Refining Co., Chicago. Booth 100.

H

Handy & Harman, New York City. Booths 44-45.

Hard Face Welding & Machine Co., Inc., Buffalo. Booth 79.

Harnischfeger Corp., Milwaukee. Booths 7-9.

Heath Engineering Co., Fort Collins, Colo. Booth 155.

Herrick Mfg. Corp., C. B., Cleveland. Booth 153.

Hobart Brothers Co., The, Troy, Ohio. Booths 16 and 33.

I

Industrial X-Ray Engineers, Woodbridge, N. J. Booths 84-85.

International Nickel Co., The, New York City. Booths 158-161.

J

Jackson Products, Warren, Mich. Booth 6.

K

KSM Products, Inc., Merchantville, N. J. Booth 154.

L

Lincoln Electric Co., The, Cleveland. Booths 86-89.

Liquid Carbonic Corp., The, Chicago. Booths 134-135.

Lukens Steel Co., Coatesville, Pa. Booths 35-36.

M

McKay Co., Pittsburgh. Booth 91.

Magnaflux Corp., Chicago. Booth 40.

Marquette Mfg. Co., Inc., Minneapolis. Booth 116.

Metal & Thermit Corp., New York City. Booths 37-39.

Miller Electric Mfg. Co., Appleton, Wis. Booths 24-25.

N

National Cylinder Gas Co., Chicago. Booths 13-15 and 64-66.

National Torch Tip Co., Pittsburgh. Booth 48.

Nelson Stud Welding, Lorain, Ohio. Booths 176-177.

New Hermes Engraving Machine Corp., New York City. Booth 151.

North American Philips Co., Inc., Mount Vernon, N. Y. Booth 152.

P

Pandjiris Weldment Co., The, St. Louis. Booths 49-51.

Porter-Cable Machine Co., Syracuse. Booth 92.

Precision Welder & Flexopress Corp., Cincinnati. Booths 111-112.

R

Ragle Industries, J. M., Kansas City, Mo. Booth 127.

Robotron Corp., Detroit. Booth 129.

Root, Neal & Co., Buffalo. Booth 143.

Rosenberg & Co., H. Z., Buffalo. Booth 126.

Ross Operating Valve Co., Detroit. Booths 156-157.

S

Sciaky Brothers, Inc., Chicago. Booths 132-133.

Sellstrom Mfg. Co., Chicago. Booth 119.

Service Diamond Tool Co., Ferndale, Mich. Booth 115.

Sight Feed Generator Co., The, West Alexandria, Ohio. Booths 104-105.

Smith Welding Equipment Corp., Minneapolis. Booths 139-40.

Sterling Associates, Inc., New York City. Booth 145.

Sylvania Electric Products, Inc., New York City. Booth 57.

T

Taylor-Winfield Corp., The, Warren, Ohio. Booths 59-60.

Tempil Corp., New York City, Booth 144.

Thomson Electric Welder Co., Lynn, Mass. Booths 124-125.

Tweco Products Co., Wichita. Booth 56.

U

Union Carbide & Carbon Corp., New York City. Booths 70-77.

United Specialty Corp., El Dorado, Ark. Booth 117.

United Wire & Supply Corp., Providence. Booth 147.

V

Vacu-Blast Co., Inc., Belmont, Calif. Booth 95.

Exhibitors . . .

VELOCITY-POWER TOOL CO., Pittsburgh. Booth 114.

VICTOR EQUIPMENT CO., San Francisco. Booth 103.

W

WW ALLOYS, INC., Detroit, Division of Fansteel Metallurgical Corp., Booth 34.

WAGNER MFG. CO., Jackson, Mo. Booth 12.

WALL COLMONOY CORP., Detroit. Booths 41-42.

WELDING ALLOYS MFG. CO., Newark, N. J. Booth 80.

WELDING ENGINEER, New York City. Booth 58.

WELTRONIC CO., Detroit. Booth 5.

WESTINGHOUSE ELECTRIC CORP., Pittsburgh. Booths 17-22.

WORTHINGTON CORP., Harrison, N. J. Booths 67-69.

WELDING SALES CLIMBED

(Continued from page 45)

up 10%, however, to $19,000,000 for the year. In all, over $49,000,000 was spent last year by the users of gas welding for equipment, supplies and rods. Including welding gases, the total expenditures in the gas welding field were over $418,000,000.

Sales of resistance-welding machines, electrodes and controls totaled slightly over $38,000,000. This is a $3,500,000 reduction from 1952. To offset the decline, however, the industry had on its books unfilled orders totaling nearly $7,000,000 at the close of the year.

WHERE WERE THE SALES?

Following the pattern that has been set since World War II, a major portion of the welding sales were in the East, North Central and Middle East sections of the country. More than 50% of the sales of the industry went into the states of those areas. No significant change in the overall marketing picture of the welding industry occurred. A slight loss on the Pacific Coast was picked up by the West South Central area.

NO WELDOR PRIMA DONNAS

A frequent question asked by manufacturers is who specifies and who buys welding equipment? At one time the weldor, the man who works with the equipment, was an important factor in its buying. This picture, however, changed during World War II, and the weldor has never regained his "prima donna" status. During World War II and afterwards, supervisors, engineers and others who worked with welding found out that many welding materials were similar in characteristics since their manufacture was to close specifications and tolerances.

The specifications and standards which have introduced uniformity in welding were developed by the American Welding Society, National Electrical Manufacturers' Association, Resistance Welder Manufacturers' Association and the Underwriters' Laboratories. The adoption of standards to meet definite performance characteristics and specifications has meant that engineers, supervisors and executive personnel have become the specifiers and buyers of welding equipment instead of the man in the shop. When quality control and engineered standards were introduced in industrial plants using welding, the importance of the individual weldor as a purchasing factor fell by the way.

A survey recently completed by WELDING ENGINEER revealed that 85% of the goods and services sold in the welding field were purchased by plants engaged in production welding or contract welding shops which employed 20 or more people. The smaller shops, garages and similar places using welding represent a market of only 15%.

WHAT'S TO COME?

Colors for a glowing picture in 1954 are provided by new developments in submerged-arc welding, increasing use of Mig (metal inert-gas) and Tig (tungsten inert-gas) welding, and the development of high-speed contact electrodes for manual arc welding.

The expansion of welding activities includes flame-cutting and flame-treating processes as well. It is difficult to find a product that is produced by arc welding that has not first been prepared by flame-cutting.

Though some people would be inclined to tell you that there is nothing new to come in welding, 1954 will undoubtedly hold some unusual developments in the further refinements of submerged-arc welding by use of a magnetic flux.* It will not be surprising if before too long this process will find its way to use in overhead welding. Already in submerged-arc welding we have seen "3 o'clock welding" methods adopted for the field erection of tanks. Before too long, all of the field erection will be submerged-arc. Vertical welding by the submerged arc process is even closer in the future than automatic welding.

Further developments in contact electrodes will undoubtedly lead to more widespread use of this type of electrode. Possibly the year will see the development of AWS specifications for contact electrodes. For those on the market today, the E-7020 Specification appears to be the most easy to meet.

From the looks of the industry at mid-year 1954, it appears to us that this will be the best year that the welding market has ever known from a sales standpoint.

*See "Welding with Magnetic Flux," WELDING ENGINEER, February, 1954.

Aluminum tubing saved oil refinery $50,000

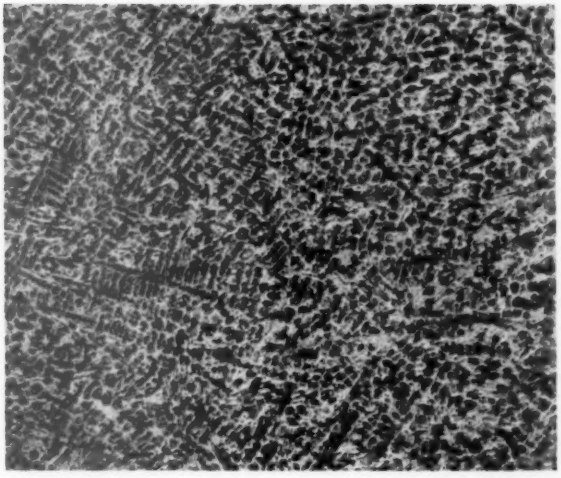
Esso Standard Oil Co. had redesigned seven wax sweater units at its refinery in Baton Rouge, La. Wax sweaters are open, pan-type cooling units for removing wax from oils. Each required 900 return fittings, 120 elbows and about 58,000 ft of 1-in. OD tubing with walls 0.065 in.

It was desired to retube with coils fabricated from aluminum tubing and fittings, but the proper fittings did not exist and techniques for welding the thin-walled tube to fittings had not been developed.

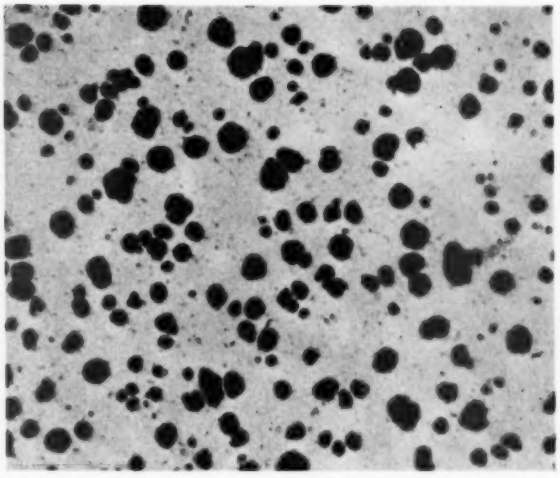
The engineering service division of Tube Turns, Louisville, Ky., and the development division of Alcoa, Pittsburgh, went to work jointly on these problems. Tube Turns provided long-radius 180° returns and 90° elbows with small tangents on each end. Alcoa developed a new aluminum brazing technique, which consists of joining the flared ends of the tubing to the fittings by brazing with a double-tipped oxyhydrogen torch.

For the retubing project. Alclad 3S-F alloy was selected. The internal cladding protects the tubing and fittings from corrosion by its own electrolytic action with the rest of the material.

The switch to aluminum from copper saved Esso about $7,000 per unit, $50,000 on the complete job.



AS-WELDED 100 X



ANNEALED 100 X

New way to repair ductile iron

It's not too difficult to fill up blowholes and shrinkage cavities in ductile-iron castings. This new technique will produce sound, crack-free welds.

THE salvage of porous ductile iron castings is an important consideration for a company engaged in die fabrication. Blowholes and slag inclusions are apt to occur in all cast materials. Sometimes an imperfection will reveal itself only after a long, difficult and expensive finishing operation is nearing completion.

Fortunately, the imperfections can in most cases be drilled out and plugged with sound metal. An ingenious technique for salvage of ductile iron castings has been developed at North American Aviation, Inc., Los Angeles. The inert-gas welding process is used with argon shielding gas and a carbon electrode.

The use of the carbon electrode is said to be vital to the success of this salvage technique. If a tungsten electrode is used, a small portion of the tungsten will melt down and spray over the molten metal. This will form an extremely hard overlay, which is practically impossible to machine.

The two photomicrographs above, magnification 100 X, show the ductile iron weld as deposited (left) and as softened by an annealing heat treatment (right). The welded specimen of ductile iron was annealed at 1,650 F for 1½ hours and then furnace cooled. If the nature of the casting is such as to permit an annealing heat treatment, the welded area can be made as soft as the parent metal, resulting in a homogeneous, nondetectable repair. The welded area will be ductile iron and will exhibit the same general characteristics as the base metal.

HERE'S THE PROCEDURE

First, place the casting in a furnace and thoroughly preheat it at from 500 to 600 F. After casting has been removed from the furnace, the weld zone should be kept hot by playing an oxyacetylene torch flame into and around the cavity. While this heating is going on, the cavity and surrounding area are primed with a cast-iron welding flux.

The end of a filler rod of cast ductile iron, ⅛ to ¼ in. in diameter, is heated and covered with the same cast-iron flux. When the rod is ready to use, the oxyacetylene torch is removed and the gas-shielded carbon arc is applied to the exposed surface.

Says North American Aviation:

"Puddle porous surfaces and feed cavity with ductile iron welding rod until sufficient metal is deposited to bring the surfaces to the level required. Use generous amounts of flux and allow slag to form on top of the weld. This prevents cracking by retarding the cooling rate. Place an asbestos blanket over work immediately and do not allow air drafts to blow on work."

Though argon gas was used to create the inert atmosphere, helium probably would have been as satisfactory, the company's report states. Best results were secured with direct current, straight polarity (electrode negative).

Most ductile iron dies were finished by hand grinding. The welds readily dress down under the grinding wheel.

METAL-ARC WELDING

Metal-arc welding (d-c reverse polarity) can be used to weld ductile iron to itself or to other metals. The metals should be clean, and the skin of the casting should be removed adjacent to the weld. To minimize the hazard of cracking, the casting should be preheated to 600 F. A 60% nickel-40% iron electrode will give machinable welds. Welding current should be on the low side, about as follows:

Electrode	Amperes
3/32 in.	60-70
⅛ in.	90-100
5/32 in.	120-130
3/16 in.	140-150

Myself This is the writer, Bert Lansing, in his welding shop, working on a job

Brothers Bob Lansing is at the controls, Art at the far side. I am on near side

131 years of welding in our

Bert Lansing, born 1890, has been in welding 36 years. Yet he's still the baby of the family. His brothers, Art and Bob, both have longer records as weldors, and their father was a weldor before any of them.

BY BERT LANSING
Pittsburg, California

ONE day a neighbor walked into my shop and asked me to weld his leg. Kind of a shock, but I recovered quickly enough to do his job—a broken ankle hinge of brass.

At the Navy Yard in Philadelphia, an engineer held out his hand and said, "Weld that for me." I asked him which finger he wanted welded, but he got peeved. So I peered closely and saw two coils of wire as fine as in a Mazda lamp. He really wanted them welded, so I apologized. The wire was so fine a breath would have blown the coils away. I weighted them, lapped the ends slightly to get double metal, used the smallest possible tip and only the side of the flame, and got the job done.

WELDING A WHATSIS?

Similarly, a chemist brought me what looked like a dirty water glass from a boiler. He wanted the end welded up. He also got a kidding answer, which I soon regretted. I again had to apologize as I found out he meant it. By pouring on heat enough to have melted steel several times that big, I got the thing red hot (it never did melt). Then I bent the edge over with a steel rod till the material met in the middle and fused it by pushing it together (is that fusion welding?). I wanted to know what I had been working with, so I asked the chemist. He told me it was silica. We weldors sure run into some queer deals.

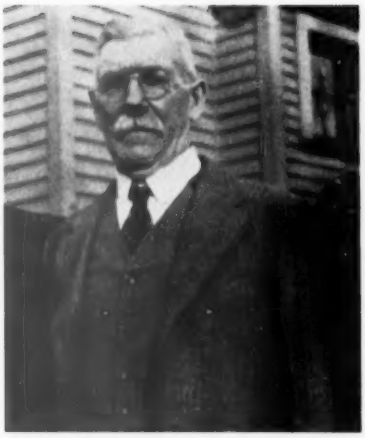
Being able to recall many such jobs from my 36 years of welding, and the even longer periods by two of my brothers, to say nothing of our father Charles D. Lansing, who taught his boys all they know, I wrote THE WELDING ENGINEER to find out if your readers would be interested. Your editor replied (in effect), "Sure, send them along." So here goes.

We'll start at the beginning. Soon after the first torch came into this country, our father gave up his foremanship for the Iowa Farming Tool Co. and went to the Davis Bournonville Co. in Chicago to learn welding. In those earliest days, he accurately foretold the welding of ships, bridges, buildings and machinery. But at first he couln't make a success of welding as a business because some of his cast-iron jobs, though welded strong, would crack or break somewhere else. Expansion and contraction problems had not yet been mastered.

In 1914, he went to Ohio to start a welded products department for the Youngstown Iron and Steel Co. The products made were for Maxwell, Cadillac, Briscoe, etc. Ancient cars! Soon Dad's oldest boy, Bob, was welding for him. Then the youngest, Art, joined them. Another boy, Bert (that's me), was out in Kansas as an athletic director. Glowing tales of welding and its future reached me from Youngstown. The magnet drew, and Bert was soon in Youngstown learning welding from his Dad.

Now imagine this! I'm 64 years old and have had 36 years of welding at Hartford Boiler, Corsair Aircraft, etc., etc. Yet in welding, I'm the baby of the family. Phooey! ! Friends have thought it strange that I gave up a profession for a manual trade. But I have really liked it better, had fewer headaches, always had work at the standard rate or better, and I sincerely believe that I have done better financially.

Dad put me through the brazing



Dad **Charles D. Lansing. He taught us all to weld**

family

and welding of steel and cast iron. Then one day he brought me an old aluminum drinking cup with an oxidized pinhole in the bottom. Having heard aluminum was delicate, I got a small tip to use with the flux and rod. Gently I heated the cup, and suddenly you could have put a pencil through the hole. I tried again very carefully, and the hole was the size of a dime. I switched to the other side of the hole, and succeeded in making it the size of a quarter. When it got to the half-dollar stage, I took it over and laid it on Dad's desk. "There's your cup," I said and walked quickly away. After a few steps, I whirled around to see him laughing fit to bust. Yes, we learned the hard way. No schools, no *Welding Encyclopedia*. Just trial and error, eventually turning to trial and success.

When the department was moved to nearby Warren, Dad asked to stay in Youngstown as maintenance weldor. At past 70 years of age, he was still welding there—didn't want to retire. Bob took Dad's place in the welding department at Warren.

Bob had thousands of aluminum washing machine tubs to weld to legs. The tubs were 1/16 in. thick and the legs were 3/16 in. thick. And the inside of the tub had to be left smooth. This, of course, would be easier today with inert-gas welding.

WELDOR Bert Lansing, who worked days in a shipyard, gets a few pointers from instructor Herbert Lansing, who taught night courses at New York Tech

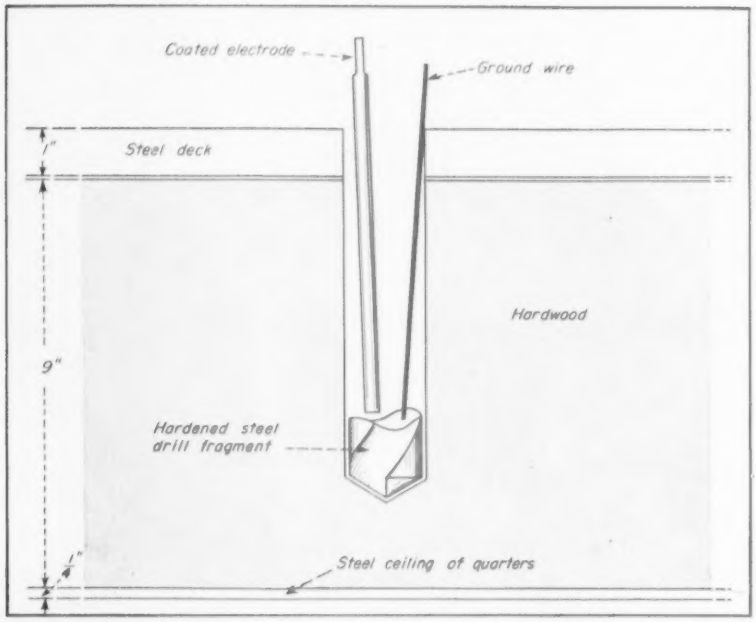
Art now has a job-welding shop in Youngstown. He taught me a new wrinkle in welding gasoline tanks. The original method was to steam them out with live steam for three and a half to four hours. If the weld was near the filling hole, they could be filled with water to just below the weld. One weldor was foolish enough to empty the water out before welding. He was killed.

Art's way was simple and safe. He would fit a hose on the exhaust pipe of a car and put the other end of the hose in the empty gasoline tank. By running the car motor about ten minutes all air and gasoline fumes were driven out and replaced by carbon monoxide gas. The motor was kept running during the welding operation, just to make sure.

Here I will give the safe practice for welding branch lines to city gas mains, of which I have done over a thousand. First make sure there is at least a little gas pressure ON the line. If there is no pressure, air may have gotten in, which will make an explosion possible. Place a coupling on the main and weld with either gas or arc. The gas men (with their masks on) will later drill the hole for the gas to come through.

While referring to safe practices, a weldor I know had to make a cut out in the yard. Having no table, he laid the plate on a couple of spare oxygen tanks. We took up a collection for his family.

Another weldor smelled acetylene from the generator line, which came into the building just under the roof. Up there on a ladder, he lit a match to find the leak. He found it! Sheets



SOLUTION to the broken drill problem (see text). Hardened steel fragment of drill was embedded in the hole. What would you do to get it out?

of galvanized roofing blew off, and the weldor was blown to the floor. Fortunately, he was not critically injured.

At a steel mill near here, a weldor was told to cut a few feet off of an overhanging beam. Believe it or not, he sat on the end backwards and made a cut in front of him. Talk about sawing off the limb on which you sit! I didn't think anyone could actually be that dumb until I saw it done. He fell with the piece to the floor.

Yes, welding does have its dangerous side, but it's plain old carelessness that's the cause of accidents. A fellow who is not willing to be careful should not take up welding. Our family has had a wonderful record in this regard. In the 131 years of welding that the four of us have piled up, we have never had more than minor scratches or burns due to welding.

Billing a Doctor

I had a lot of fun with a doctor, who sent me a broken cast-iron arm from one of his tables to be welded. I sent him a note thanking him for sending me a patient. I told him I had diagnosed the ailment as a fractured humerus (broken upper arm), and it had been necessary to use temporary splints for alignment. I said the patient's temperature had run high during the operation, but the operation was a success, and the patient was now resting quietly with temperature returning to normal. Then I billed him:

Use of operating table	$0.50
Anaesthetic (gases)	0.50
Operation	2.00
Total	$3.00

Which was what the job was worth.

When the Union Freight Terminal was built in Chicago, I had a couple of unusual jobs on it. Some foolish workman had snubbed the cable around the framework of the 240-ft concrete tower and almost toppled the upper 100 ft to the ground. I was up there cutting rivets and heating angles till long after dark. Then I held my torch as a flare light for the others to get down (no ladder). After shutting off the torch, I traveled the longest 140 feet of my life, shinnying down the steel framework in the dark.

Also on this job, they had some angles 95 ft down in the bottom of the No. 6 caisson, which the sand hogs wanted cut as they couldn't pull them out. But water was seeping in from the Chicago River so fast they couldn't get the water level down to where the cuts were to be made. After I had waited 4½ hours, I found out what the trouble was. I told them I would do the job under water. I used a big tip to compensate for the water cooling the metal and also to blow some of the water away. I lit the torch, plunged it into the water and had the cuts made in about 20 minutes. The only catch to this is to use a spiral mixer torch (eastern or western model). I have tried others without success. During the cutting, bubbles of unburned gas would form. When the water was pushed between the bubble and the flame, the bubble would explode. It threw water aplenty and sounded like a machine gun, but it did the job, so who cared. When I finished and went up it was 3:30 a.m. I reported to the superintendent and asked if that was all for the day.

"See that pile of tamping hay?" he asked. "Don't you know how to use it?"

I said, "I expect I do." And I laid down and had a couple of hours of the sweetest sleep of my life at $5 per hour.

Welder and Weldor

This terminal was a union job, as were many others I worked on. Long before I had written the A. F. of L. to say I was doing work for many unions which they couldn't do themselves—Ironworkers, Boilermakers, Steamfitters, Caisson and others. I told them I was anxious to take out a card that would allow me to do this work, but that I couldn't take out cards in all these unions. I will never forget their reply. They said, in effect, that a welder was a tool—not a trade. And because you can't organize tools you can't have a welder's union. The effort of The Welding Engineer to differentiate by calling the machine a welder and the man a weldor has my heartiest support.

Welding is the trade of fusing metals just as much as carpentry is the trade of joining wood. I think that the A. F. of L. should be ashamed of themselves for sticking to that fallacy all these years that a weldor is only a tool. There is a greater need today for a 'veldors' union than there ever was.

My spiral mixer torch was used on a job at Oil City. A caisson had been built in the river for the center pier of a railroad bridge. This was of sheet piling with the expanded round edge of one sheet sliding down in the C-shaped edge of the next sheet. They had planned on leaving stub ends below the surface of the

water, as it was not a navigable river. But Federal inspectors said the Government might want to make the river navigable sometime so the stubs would have to come out. Yet they were driven in so tight they couldn't be pulled out and would have to be cut.

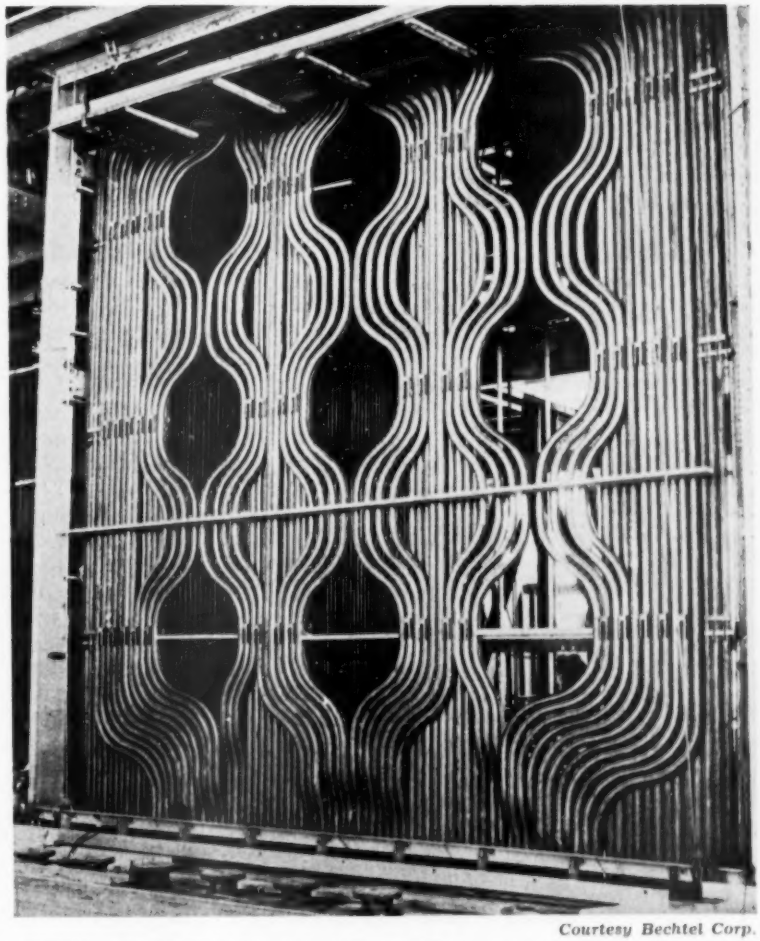
Outside the caisson, the water was 6 ft higher than the cut. And the joints were so loose water was just pouring down. In the worst places it was almost impossible to see the head of the torch while cutting. Yet the joints were the points of greatest difficulty, as three layers of metal had to be cut; the two edges of the "C" and the ball-like part of the next sheet filling the "C". I cut 38 ft of this in less than four hours, using 1 cylinder of acetylene and 1½ cylinders of oxygen. The contractor started giving me a bad time over the contract price, but I was ready for that. I told him his foreman had me cut six large bolts that weren't in the contract, so by rights I should give him an extra bill. That ended all argument.

Broken Drill in Hole

An interesting problem came up on a cargo ship that was being armed. Holes of 1-in. diameter had to be drilled through the 1-in. steel surface of the deck, then through 6 in. of hardwood, then through the ¼-in. steel ceiling of the room below. The wood was wet, a drill choked and a short piece broke off and wedged down in the wood. A conference of ironworkers, shipfitters, machinists and others could not find any way to get the piece out. A friend of mine in the group came over and asked me if I could. I replied, "Yes, but it will take me two or three minutes." Bragging, of course, but I knew I could make good.

I pulled my cable over and dropped a bare wire from the deck plate down to the fragment at the bottom of the hole. This made a ground connection to the deck plate. A long arc heated the piece white hot in a few seconds. The electrode was welded to the piece for a handle, and it lifted out easily (see sketch).

Flexible tubing is interesting to make. You take regular tubing and corrugate it, which shortens it to about one-third of its original length. To prevent it from lengthening again under pressure, you cover the tubing with a tight braid that is welded to it at both ends. After I had welded my first flexible tube, the foreman told me to test it at 2,000 psi. I could hardly believe he was serious because the tubing was only 0.009-in. wall thickness. He laughed and told me, "We have had as high as 3,000 psi on tubing 0.003 in. thick."



Courtesy Bechtel Corp.

BEING only 64, Bert Lansing easily qualified as a weldor to work on this job. The bent boiler tubes around openings are called "spaghetti"

My Biggest Job

One of my biggest jobs was on the side frame for a steam hammer. It weighed seven tons. A corner of the base and a section of the slide had broken off and were missing. We built a firebrick furnace under and around it. In this we dumped three wheelbarrow loads of coke and 45 bushels of charcoal. After 6 hours of preheating, the frame was ready for welding. Firebricks were placed to keep the molten metal in place at the corner. Filler scrap cast iron was melted in this pocket and fused to the casting by three torches five to seven feet long. Each of the three weldors had a railing in front of him to rest the big torch on. Asbestos sheets were hung over the railings, but in addition buckets of water were needed for the weldors to plunge their gloved hands in every few minutes. When the metal had been filled to the top of the first firebrick, another row was added and later a third and fourth. Altogether, 700 lb of metal were welded to this corner in a little over four hours.

The slide on top was done in a somewhat similar manner, using brick to hold the metal. Only the two 7-ft torches were needed here. We melted 400 lb of metal and added it in about three hours.

One day I was welding three patches on a water tower 73 ft above ground. My friend Charley was helping me, passing things up by hand line to the swinging scaffold. I needed

rods and looked down—no Charley! About 20 minutes later he showed up. He said he had been down to the corner having a beer! Guess what I said.

In the days before piecework was outlawed by the unions, I revamped the method of doing brass dirigible valves to five times the previous rate. The stem and disc were similar to those of a car tube, only larger. The old method had been to point the flame toward the second one while silver soldering the first, etc. This gave a slight preheating effect, but still over 90% of the time was consumed in bringing the valves to proper temperature. Actually, only a couple of seconds were needed to flow the silver solder on. I made a steel merry-go-round that held 60 valves, and built a tunnel over part of it. City gas heated the valves as they came through the tunnel. The heat was so regulated that the valves were ready for the silver solder as soon as they emerged from the tunnel. My fair-minded employer gave me a rate on it that averaged three times my hourly rate. I never hurt myself working piecework, and I never knew anyone else who did.

I Blow My Top

Here was a queer deal. An engineer brought me a round block 2 in. thick and wanted a paper-thin disc welded on the flat surface. He didn't even know he was asking for something very difficult. I heated the block white hot, dropped the disc into place and got it welded. About an hour later he brought it back, saying, "I made a mistake. *Weld* it off for me." I was going to cut it with the torch, but he stopped me. "Wait," he said. "I want to save that piece." Then I blew my top and told him off.

I had one job where big money was forced on me. One of my customers had five new laundry machines that handled 20 washes at once. But the weight of water and clothes would spring the plates. As a plate would come up, it would go back, pinching the clothes. They wanted the plate ends welded. There were 40 welds 10 in. long on each machine. On three of the machines the plates were bronze; on the other two they were "Ambrac," an alloy which I had never seen. They wanted a price. I told them I would have to figure high because of the Ambrac. They still insisted, so I told them $35 for the 40 welds on each machine. They accepted that. When I did the job, I found Tobin bronze flowed on the Ambrac (an alloy of 75% Cu, 20% Ni, 5% Zn) as fast as I had known silver solder would on the bronze plates. I averaged less than 45 minutes on each machine.

During the last World War I worked in a shipyard and taught an evening class at New York Tech. I wanted to include in my lectures two items which I thought might be defense secrets. These were the degaussing system of ship protection from submerged mines, and the welding of heavy armorplate on battleships. I expected to be denied permission on the degaussing but thought there would be no objection to the armorplate. The reverse was true. The enemy had taken protected ships and knew all about degaussing but did not yet know about welding armorplate.

One trick I learned just because I was interested in it was the bending of cast iron. An engineer had told me it couldn't be done. He somewhat irked me, so I asked him for a 5 ft length of 2½-in. cast-iron soil pipe. I bent it near each end to make an 8-in. throw and took it back to him. No crack and no weld. I saw a motto a few years back. I liked it so well I will pass it on to you,

"Difficult things we do immediately. The impossible takes a little longer."

Cast-iron bending came in handy when I received seven cast "Lynite" grills that were to be bent to fit the curved risers of the steps in a spiral staircase. They were done the same as if they were cast iron, except at a lower temperature. It was a tedious, meticulous job to bend seven of them the entire length, and I frankly admit I got a couple of minor cracks. So what! I welded them with a rod of the same composition, and the customer was highly pleased as he had thought it couldn't be done.

They often ask me, "How long does it take to learn welding?" You can't answer it until you know what they mean by welding. If it's arc welding, in the flat position, using only one machine and one kind of electrode, it takes only a few hours. But the learning time mounts up if you add position work, the use of various machines and rods, work on other metals and alloys, other processes such as gas, inert-gas-shielded, etc. Add still more time if you do flame-cutting (it burns me up when they call it "burning," and those who call me "burner" I shoot). Knowing that a man wants to learn all this, there still remains the problem of how well he wants to learn each.

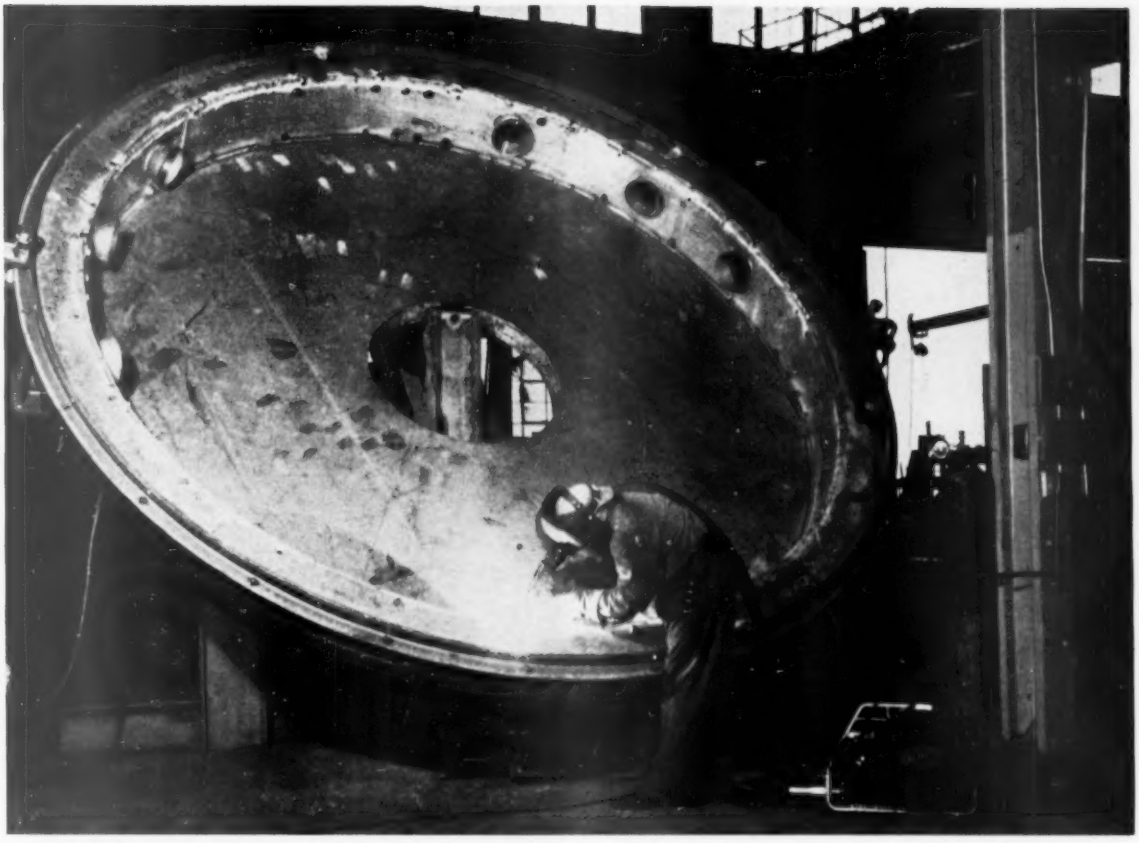
To illustrate what I mean, the Bechtel Corp. recently built a power plant near here for the Pacific Gas and Electric Co. It required about 25,000 boiler tube welds. Hartford test, of course. Of the first 62 weldors who took the test, only two passed. I was No. 3 and very pleased that at the age of 64 I could still pass such a difficult test. The boiler tubes were 95 ft long, were placed vertical, with 88 forming each side of the square boiler. Final pressure test at 2,500 psi showed one faint sweat out of the many thousands of welds. The picture (courtesy the Bechtel Corp.) shows what the job looked like—the bent tubes around the burner openings are called "spaghetti." It takes years before you can qualify for work like this.

Tarzan-Type Weld

I have saved the most unbelievable for the last. When the Youngstown Hospital was built, I was called in to make a weld on the coil in the ammonia tank of the cooling system. The tank was 4 by 10 ft, 4½ ft deep. The coil filled it vertically and sideways, with a 12-in. space at the end. The weld to be made was the bottom end of the coil.

I was so miffed that I told the contractor that no one but a fool would design a thing like that. Even if you got your head and arms down there to make the weld, you couldn't see the back of the pipe, which was half of the weld. After stewing around for a while, working off some of the heat I had generated, I finally got busy.

I hung by my knees from the edge of the tank, my back against the end of the tank, my chest against the coil, arms akimbo (the only place for them). With the torch and rod poking through between the coils, I made the back half of that weld without ever seeing it. By this time I was dizzy, so came up for a while. Then I went down again and made the front half. The weld held 1,800 psi pressure. The ironical part of it is that I was working for wages then, so all I got out of the most difficult job of my life was about $3.



PRESSURE-vessel head 14 ft 11 in. in diameter was made by welding together components of ½-in. nickel-clad plate

Nickel-clad vessel Mig welded

BY D. V. WILCOX AND L. W. KUNKLER
Regional process representatives, Air Reduction Sales Co.

BASIC welding problem with nickel-clad material is to hold iron dilution or pick-up in the deposit within allowable limits. If penetration is too deep, iron pick-up from the steel portion will contaminate the nickel deposit and so reduce its corrosion resistance.

Base metal dilution is easily controlled with the metal inert-gas or Mig process by the use of the proper shielding gas and welding technique. Moreover, the deposition speeds obtainable make the use of the process almost mandatory on relatively clad materials if maximum economies are to be realized.

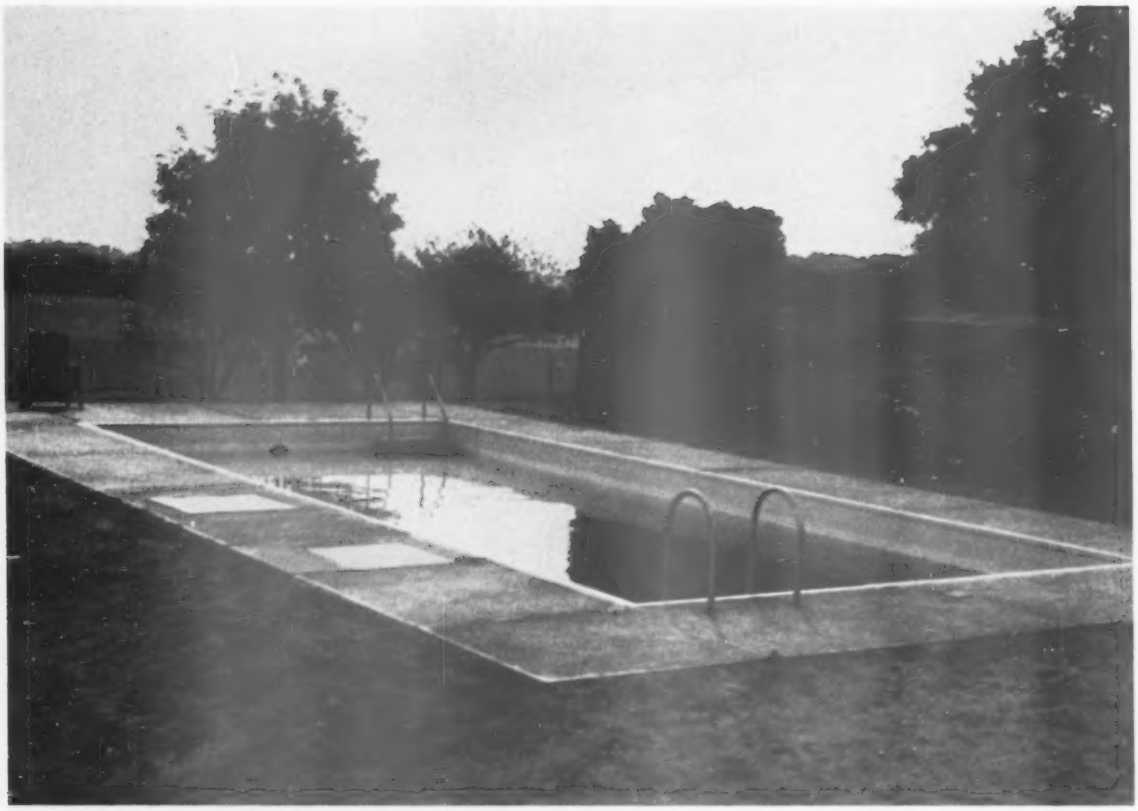
As an example, let us look at the welding of a huge nickel-clad vessel at McAleenan Brothers, of Pittsburgh. Replacement of the stick electrode process by Mig welding resulted in an estimated 25% saving in welding time. Elimination of postweld cleaning and high welding speed were main factors contributing to this saving. Because the coiled welding wire is not coated, the completed weld requires no slag removal. Spatter was kept to a minimum, and a smooth, clean finish was obtained.

The time-consuming small-bead technique of the older method was found unnecessary as far as quality of result was concerned. The Mig welds easily passed rigid government inspection for soundness and for absence of cracking and undercutting. Iron pick-up was held well within allowable limits, as revealed by an acid test.

Welding was performed in a convenient downhand manner by easy positioning of the vessel head on a turntable jig. The special fabricated head—14 ft 11 in. ID—was manually welded on this turntable. The material was ½-in. thick, 20% nickel-clad plate.

First, a ½-in. rolled edge weld was made to connect two ½-in. plates of 20% nickel-clad. Welding conditions: 350 amp, d-c reverse polarity; 1/16-in. electrode wire; 50 cfh argon; 26-volt arc. The tilting and rotating jig allowed the operator to work in a comfortable downhand position. Dense metal, absence of undercut were qualities characteristic of this rolled edge weld.

To join the side and bottom of the fabricated head, a ⅜-in. fillet weld was deposited. Welding conditions for this corner weld: 400 amp, 25 volts, d-c, reverse polarity, 1/16-in. nickel electrode wire, 50 cfh of argon and a backhand technique. A weld of smooth contour was produced that required no cleaning.



COMPLETED pool is landscaped and ready for bathers; it has that "ole swimming hole" feeling. If you want to know how this pool was built look at the four pictures on the next page. Then read the text for full details

The "ole swimming hole"

Every man at some time in his life has dreamed of owning a private swimming pool. Most of us never will, but thanks to welding, we will have opportunities to swim more often . . . at the club, amusement park, hotel or motel.

BY HERMAN C. PHELPS

A REFRESHING dip in a cool pool is one of the greatest pleasures that can be experienced. It's much too much fun to be reserved exclusively for the rich. The rest of us like to swim, too.

The chances are that we will have the opportunity to go swimming more often . . . at the club, the local amusement park, the city playground and at hotels and motels. Especially at motels—more and more of them are turning to this "luxury" as a lure to ensnare the traveling public. It's very good business, too, because a motel with a swimming pool is usually able to get away with substantially higher rates than its pool-less competitors.

STEEL SWIMMING POOLS

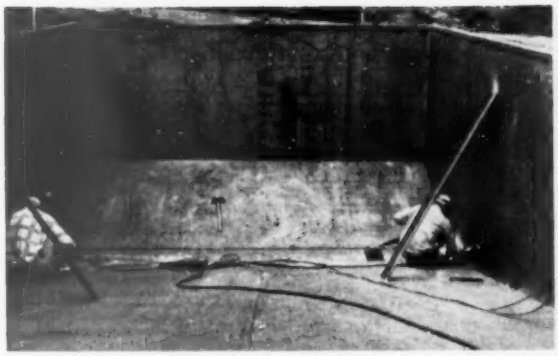
To meet the growing demand for swimming pools is the business of Koven Steel Swimming Pools, Inc., of Jersey City, N. J. The all-welded steel pool proves to have a great many advantages over the old concrete type: speedier construction, low maintenance (a coat of paint every two years), no leaks and freedom from cracking. Leaking and buckling are both almost unheard of with this type of construction. Furthermore, the owner of such a pool does not have to drain it in the winter. Even if it's outdoors, it will not be harmed by holding ice all through the winter.

One private pool of the welded steel type has been in continuous service for 22 years without showing a sign of deterioration.

The photographs above show a typical Koven pool at various stages of construction. Let's see how such a pool is built and installed.

In planning a swimming pool, the first consideration of the prospective owner is the proper size to make it. Naturally, costs are a contributing factor, but it is far better to build the pool big enough in the beginning than to have to enlarge it later.

Next comes the choice of a location. The available water supply, bath house and locker facilities, filtration equipment, lighting, etc. must all be considered. We'll get to the welding soon, but first the bottom must be



CREW of two at the bottom of the pool. One man is welding while the other cuts outlet for drain scupper

WELDOR Willard Louri is welding the "break plate" at bottom of sloping vee in deepest part of the pool

CUTTING a hole for the filling pipe. Note jeep; it holds both welding equipment and an air compressor

POOL is below basement level of house. Box in the foreground holds filtering system to keep pool clean

brought up to date

set on six inches or more of fine gravel with ample drain tile to carry away subsurface water and prevent it from settling underneath.

Prefabricated Construction

The pool shown in the pictures measures 16 by 40 feet. The steel for it was trucked to the site in eleven sections and required only four hours to set up by the rigger. Before installation, all steel parts to be exposed to the earth were given a good coat of black asphalt. This includes a 2 by 4 in. channel placed beneath the bottom plates of the pool.

The shallow end of the pool is 2 ft 11 in. It has a scum gutter welded across the top that also acts as a stiffener. This gutter was shop formed.

The deep end is 6 ft 1 in. (the deepest part is 8 ft 1 in.). The sides have a 2 by 4 in. channel (also shop made) welded around the top. A 12-in. angle is welded around the top 2 in. below the channel to serve as a walkway and as an additional stiffener.

Twelve 8-in. angles are welded along each side to provide vertical stiffeners. These are tack welded for three inches at 1-ft intervals.

The side plates and stiffeners are all precision cut and butt welded, but bottom plates are all lapped at least one inch or more. This leaves room for minor adjustments in the field. The channels and walkway are welded together with splice plates.

All welding on the ¼-in. side plate is done manually with 3/16-in. E-6010 electrodes, d-c, reverse polarity. The bottom plates are welded with ¼-in. E-6012 a-c/d-c electrodes.

Welding procedure is a back-step method. A distance of about 10 or 12 in. is welded, after which the next bead is started behind the previous one and tied to the beginning of the previous weld. A 10 or 12 in. interval in then skipped and a new bead started of the same length. Back stepping positively eliminates plate warpage.

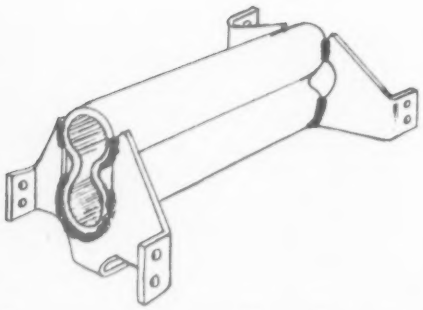
Machine adjustment is usually 300 amp on ¼-in. electrodes and 175 amp on 3/16-in. electrodes. The smaller size is for vertical welding.

Welded in a Hurry

One man can weld a pool of this size in less than three days. After the bottom plates are properly placed by the rigger, the weldor tacks them in position. The sides are then placed in position and tacked. Usually only one jig is needed to hold the sides in perfect alignment. This is placed inside the pool near the deepest part, at the bottom of the vee or break plate.

When nearly all other welding has been completed, the previously placed channel underneath the bottom is

(Continued on page 60)

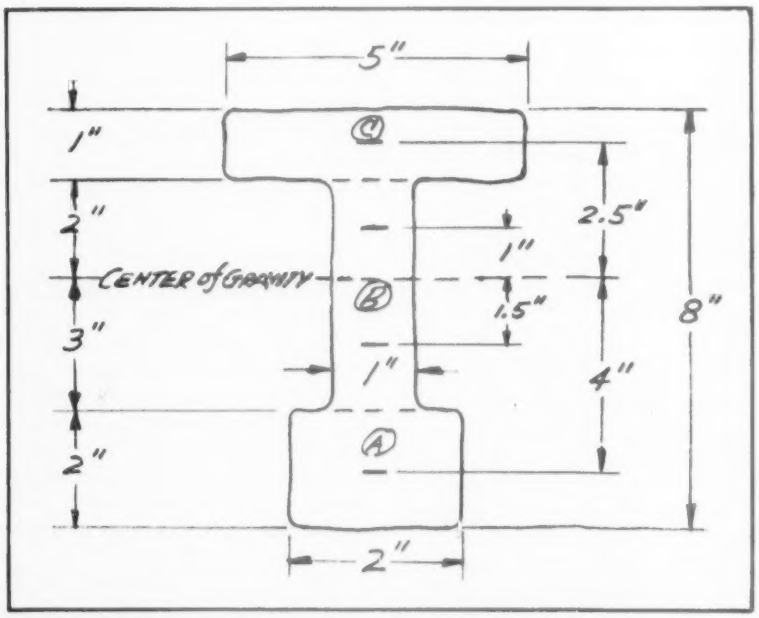


Practical design for welding—II

THESE three articles were written to give practical information that you can use in designing products for fabrication by welding. Last month, Mr. Cleveland discussed the factors that determine costs and gave an example of how a weld may be calculated to meet stipulated load requirements. In this month's installment, he shows you how to eliminate the guesswork from design computations by making the formulas in the engineering textbooks work for you.—*The Editors*

BY REX CLEVELAND
Design engineer, Minneapolis-Moline Co., Louisville

AT THE risk of being pronounced dry as dust, I would like to review the definitions, meanings and applications of the various properties of materials and sections of material that are used in mechanics and in the calculation of material strengths. The terms moment of inertia, section modulus, modulus of elasticity and ultimate strength express usable mathematical quantities. They are all properties of materials or sections. When defined in dimensions, foot-pounds, etc., they become values that can be utilized to determine such things as structural members, shaft diameters, column shapes or beam sections.



4—TO FIND moment of inertia of section, multiply area A by square of distance from center-of-gravity axis. Same for B and C. Then add products

DEFINING OUR TERMS

First a few definitions:

Moment of inertia and section modulus are properties of the *shape of the section*. Modulus of elasticity and ultimate strength are properties of the *material*. Moment of inertia is an expression of the *rigidity* of the section as related to its shape; *i.e.*, its ability to resist bending. Modulus of elasticity likewise expresses the rigidity of the material. Section modulus expresses the *strength* of the section, as related to its shape, or its ability to resist failure in tension, compression or shear. Ultimate strength, naturally, also expresses the strength of the material.

The moment of inertia of any given section is found by adding together the products of the area of each elementary section multiplied by the square of its centroid distance from the axis of the center of gravity. Thus in Fig. 4 (going from the top down), $I = 1 \times 5 \times 2.5^2$ plus $1 \times 2 \times 1^2$ plus $1 \times 3 \times 1.5^2$ plus $2 \times 2 \times 4^2 = 31.25 + 2 + 6.75 + 64 = 104.0$

The section modulus of a symmetrical section is (roughly) the moment of inertia divided by ½ the depth of the section. In the above case, it would be $104 \div 4$ or 26.0. For non-symmetrical sections, specific formulas must be used.

The modulus of elasticity of a material is the stress per square inch divided by the elongation caused by this stress in one inch. This is usually denoted by E, as I is used to represent moment of inertia. E equals 30,000,000 psi for mild steel, which is all we need to know for our calculations on weldments.

The ultimate strength of a material (tension, compression or shear) represents the load that will fracture the material. For mild steel it is 80,000

The material for these articles was adapted in part from The Lincoln Electric Company's "Weld Design" course.

psi. The ultimate strength figure is not used in design, however, because it does not include a safety factor. The figure that is used, for both tension and compression loads, is 40,000 psi.

Most weldments can be designed with the formulas and values already given. Engineering handbooks will provide values on other materials than steel, moments of inertia for most standard shapes, and other information needed for design purposes.

Material properties mean nothing without section properties. Both are meaningless unless values are assigned to them. When values are given, these properties may be used in connection with formulas for the calculation of beams, shafts, columns, etc. They are then valuable tools for the designer.

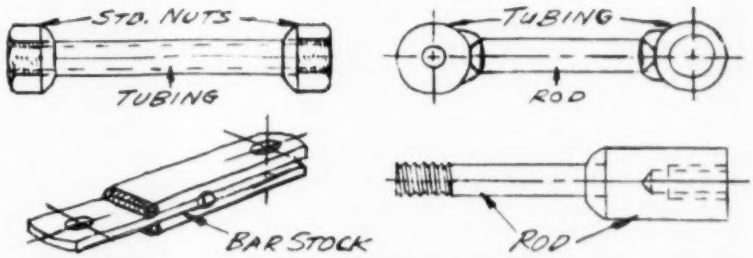
First, however, one must know the formulas or at least where to find them. Most engineering handbooks contain all the basic formulas. Properties of sections, material and loads are usually represented in the handbooks by letters. Thus:

- E = Modulus of elasticity, of material
- M = Bending moment, in inch-pounds
- I = Moment of inertia, of section, in inches^4
- Z = Section modulus, of section, in inches^3
- S = Ultimate strength, of material, in pounds per square inch
- F = Force, in pounds
- A = Area, of section, in square inches
- W = Load, in pounds
- s = Stress, in pounds per square inch
- y = Deflection, in inches
- u, v, x = Variable distances, along a beam, in inches
- l = Length, in inches
- w = Width (or thickness), in inches

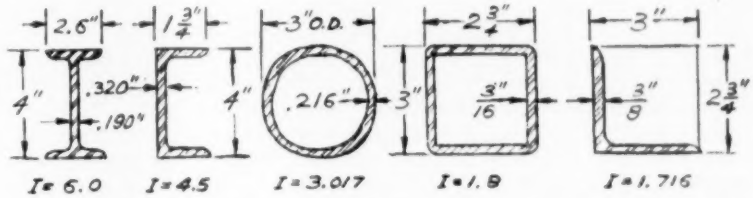
Application of the formulas to problems in design is simply a matter of substitution of values for letters, plus calculation. It is but a few algebraic steps from requirement to design with this method.

The solution of most design problems can be greatly aided by "thought starters," suggestions as to procedure, typical shapes, short cuts, tried and proved combinations, etc. Most problems evolve themselves into basic categories. Breaking them down to

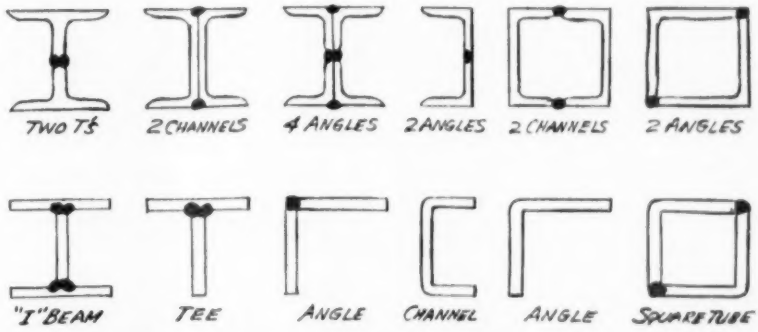
Practical design ideas taken from the designer's notebook



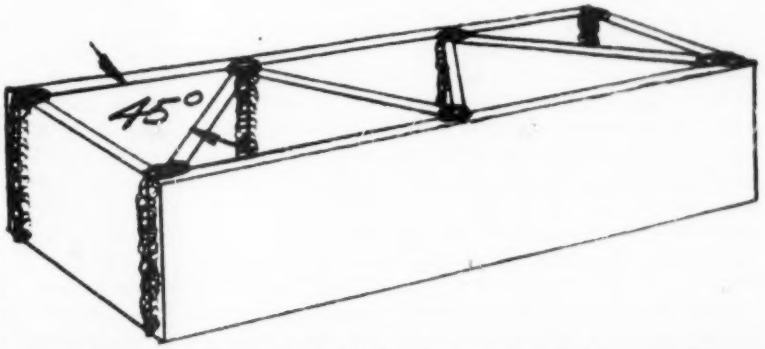
5—HERE are four examples of welded products that are to be subjected to tensile loads. This is type of loading that tends to stretch members



6—BENDING loads are something else. Here are the best beam sections to resist bending. I-beam rates first, channel second, according to their moments of inertia, I. Average weight of these sections is 3.5 lb per ft



7—UPPER drawings show how standard shapes can be combined in welded construction. Lower drawings are shapes made by welding and forming bars



8—ZIG-ZAG members made of light sheet steel will increase stiffness of an open section like this by 50% or more. It's called torsional bracing

these fundamentals sometimes helps get us off on the right foot. These basic categories are: tensile loads, bending loads, compression loads and shear (or torsion) loads.

Tensile Loads

Tension loads are those which stretch the loaded members, such as the forces exerted on tie-rods, turnbuckles, connecting links, etc. Mild-steel members will perform best in tension, supporting loads up to 40,000 psi with an adequate safety factor for most applications. Designing for tension loads, then, is a simple matter of providing an adequate cross-section at the point of greatest stress. Should such members require welding for assembly, the weld cross-section, in tension, must be equal to that of the welded members. Should it be necessary to lap the members and place the weld in shear, the fillet used must be equal in shear strength to the tensile strength of the members. Placing welds in shear should be avoided wherever possible, for it is far too costly to justify usage. Figure 5 shows several examples of welded tension members.

Bending Loads

Bending loads are those exerted at an angle, usually 90°, to a member supported at one or both ends such as a beam, a lever, a crank or a bracket. All such members can be classed as beams, and the formulas for stresses and deflection in beams are used for design purposes.

In these members, shape is all important. Here, the ability of the member to resist bending increases very rapidly as its width (or depth) increases. The moment of inertia for a 1-in. section of steel is only 0.33 at a distance of 1 in. from the axis, but at 8 in. it is 56.3. It is this property which makes an I-beam so efficient.

A good general rule to follow in designing beams is to place as much material as far from the center as possible without making the supporting section too thin. If there is danger of collapse by buckling, the thin sections may be bolstered by gussets or other stiffeners to make it possible to extend them beyond normal points of failure.

The most efficient standard sections for the support of bending loads can always be determined by comparing their moments of inertia. The sections shown in Fig. 6 are the best, and of these the I-beam ranks first. Second, on the basis of equivalent weight, is the channel. Next, in order, are the round tube, the square tube and the angle.

Many efficient combinations of standard shapes can be used to advantage in welded construction. Some "thought starters" are given in Fig. 7. Of course, all these shapes can be duplicated with bar stock, welded and formed or just welded. Some examples are shown in the lower half of Fig. 7.

Compression Loads

Like designing for tension, designing for compression loads is mostly a matter of providing sufficient material. Since compression can cause failure by buckling, the shape of the section is likewise important. The rigidity requirement can usually be met by such sections as H-beams, pipe or square tubing. Various combinations of standard shapes can be devised to produce the same results, such as two channels, two angles, etc. In all cases, the design strength of 40,000 psi for compression loading of steel is the rule. The deflection which causes collapse by buckling can be counteracted by placing material as far from the center of loading as the design will allow. This spreading of the material is particularly effective in "long-column" loading, using H-beam sections for single-direction stability, square tubing for two-direction, and pipe or round tubing for multidirection problems.

Shear Loads

Shear loads take two forms—straight and torsion. Designing for straight shear means providing ample cross-section strength figured at 25,000 psi and loading as close to the likely shear point as possible. Designing for shear produced by torsional loading is more complicated.

The most efficient shape to resist torsion is a closed section—round tubing or pipe, square tubing, etc. Solid sections should be used only where space is a critical factor. When space is not a factor, use closed shapes that will place a maximum of material as far from the torsional center as possible. Care must be taken that the section you evolve does not become so thin it will fail. Common sense will dictate safe sections.

In open sections subject to torsional loads, rigidity may be best achieved by diagonal bracing. Zig-zag members made of light sheet steel will increase the stiffness of an open section (such as shown in Fig. 8) by 50%. If the section of the diagonal braces equals that of the side members and the bracing angle is 45°, the rigidity is increased by another 15%.

Next Month: *Mr. Cleveland will conclude this series with a discussion of the savings that may be effected.*

"OLE SWIMMING HOLE"

(Continued from page 57)

plug welded to the bottom of the pool. The plug welds are made at one-foot intervals across the full width of the pool. The sides are then braced and welded to this supporting channel, which extends past the sides.

Altogether, there is about 200 ft of welding on the bottom plates and 26 ft of welding on the vertical sides to be done at the site. The drain scupper, pipe connections, filter box and lights are extra. Imagine how long it would take to rivet such an installation! This welded pool was completed in five days.

Finishing Is Easy

After all connections are in and welding completed, the welds are ground smooth. The entire exposed surface is then sandblasted perfectly clean. The same jeep that holds the portable welder holds the compressor used for sandblasting.

Painting takes about three days, which includes sandblasting. The first coat of paint is a passivator. The next two coats are undercoatings. For the fourth and fifth coats, Koven uses a very high-grade enamel.

The piping that leads to the tank and the filtering system is all 1¼-in. galvanized pipe. The tank when full holds 24,000 gallons. The filtering system must turn the water over at a rate of 20 gallons per minute. (In larger pools it is necessary to increase this rate.) Some state laws for public pools require a complete turnover of water every eight hours.

Last year Koven installed well over 50 pools. Over the past 22 years the company has built pools in sites from Florida to Lake Placid, N.Y., and out west as far as Kansas. Not one of them has sprung a leak yet!

Problem **These sheet-metal components of an oil stove had to be welded together. Fit-up was poor because of production forming**

Solution **Gaps were filled with weld metal without stopping to chip slag between the passes. This ended the porous welds**

Faster speed, fewer rejects

BY GILBERT L. BETHEL
District Engineer, Eutectic Welding Alloys Corporation

REJECTS had reached an uneconomic level for a Southern manufacturer of oil-burning stoves. The problem could not be solved by more careful workmanship. The stoves were a production job, and precision cutting and forming of the 14-, 16- and 18-gage steel would not have allowed a competitive price to be maintained. Consequently, the several sections did not fit together with the accuracy of custom-built products, and the gaps were filled with weld metal.

Where joints fitted exceptionally badly, two or more passes were necessary to fill in the gap. This frequently resulted in porous welds. Porosity could not be tolerated, especially not in joints that had to be leakproof.

The problem was thus twofold: how to speed production and how to elminate porosity. The long lap joints and corner welds had to be performed with great care because the danger of burn-through was very great on the thin-gage and on thin-to-heavy gage sheet. Either the weldor slowed down, or he produced too many rejects.

Changed Electrodes

The solution was found in a change to an all-purpose, all-position electrode especially coated for speed and poor fit-up conditions. This electrode welds at low amperage without slag interference. The constituents of the coating permit non-stop welding because of their effect upon slag formation. Instead of chipping after each pass, the weldor can immediately apply a new deposit. Deposit can be applied on top of deposit, and when the final pass has cooled the slag may be chipped easily.

It takes little current with this electrode—only 30 amp for the 3/32-in. size. This makes it suitable for the type of job faced by our stovemaker in which there exists the danger of burning through thin-gage metal.

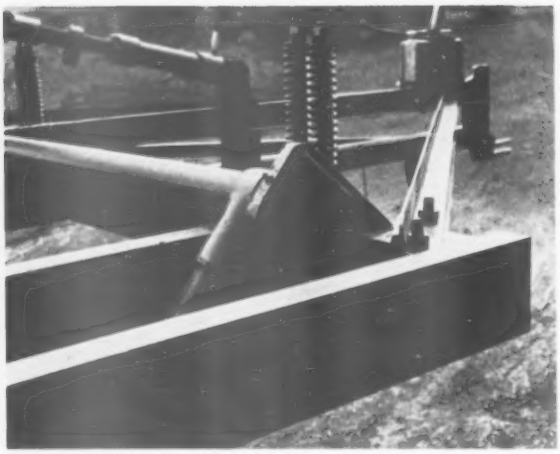
The speed of deposition depends upon the amperage setting, and should high-speed welding be desirable it is only necessary to increase the amperage. This flexibility is useful where critical work is involved and where the lowest possible heat should be used. Conversely, a reduction in amperage will slow the speed of deposit and reduce the heat input. This property has been found an advantage where trainees are concerned. They start with a low amperage setting, and as their skill increases the setting is raised. The rate of deposition thus keeps pace with their manipulative skill.

Production Went up

The changeover proved satisfactory for our stove manufacturer. Defects were reduced to the vanishing point, and no further difficulties were experienced with pinholes. Poor fitting work was no longer a handicap because pass-over-pass welding permitted the gaps to be filled without any sign of porosity. The illustration on the right shows the welded assembly. The upper right-hand corners had previously been the cause of the majority of defects.

Within a week after the changeover, production had increased 20% at this plant, and rejects were the exception rather than the rule.

3—**STRONG** welded frame is the outstanding feature of the "Cultiplow," a ten-tooth plower and cultivator



4—**HYDRAULIC** pump that raises and lowers plows is mounted on the frame of the "Cultiplow" as shown here

New farm implement

Welding and flame-cutting have moved production of farm implements closer to the farm—and have also led to a lot of fruitful new ideas in manufacture.

BY T. B. JEFFERSON

A CENTER for the manufacture of farm implements in western Canada! It is rather difficult to think of it, but Regina, Province of Saskatchewan, is developing into just such a place. Primary business of Saskatchewan is wheat growing. This requires big machinery, which must be repaired by welding and flame-cutting. The people who were called upon to do this sort of maintenance began to develop ideas of their own about how farm machinery should be designed and built.

The result is what you see today in Regina. With the indispensable assistance of flame-cutting and arc welding, a surprising volume of diversified pieces of machinery is being turned out in relatively small shops. There are about a dozen companies in Regina specializing in the manufacture of farm machinery or in the closely related equipment for road construction. None of their products are complicated, yet ruggedness has been built into them at vital points.

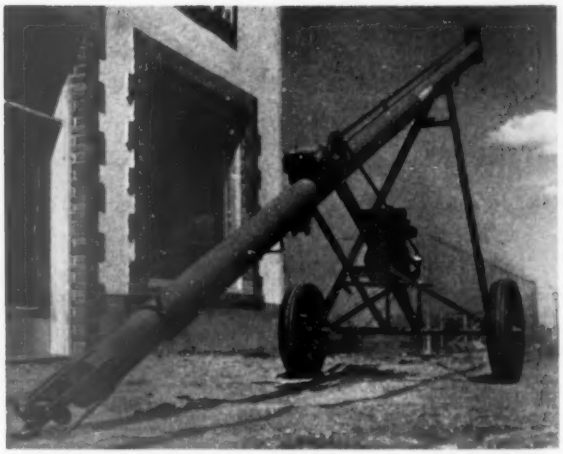
2—"**DUST**" for weed killing is forced through the tubular booms

1—**PORTABLE** grain drier was built from angles and sheet stock

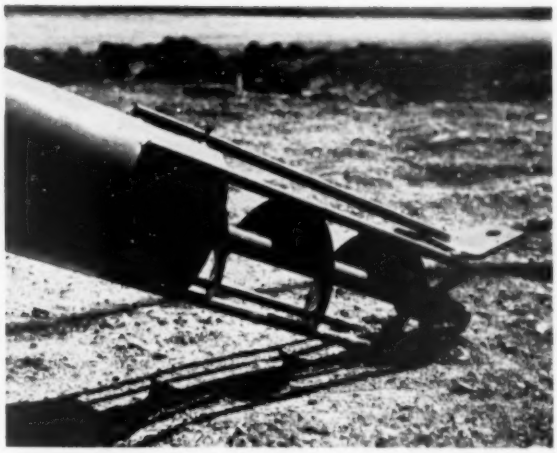
LOOK AT BRANDT ELECTRIC

The farm equipment division of Brandt Electric, Ltd., offers an excellent example of diversified farm products. Photo 1 shows a propane-fired portable grain drier. Because of the extremely short fall in this northern region, crops must frequently be harvested in bad weather. This product was designed to overcome the difficulties of a wet harvesting. It is a portable unit of all-welded construction, built largely from angles and light-gage steel sheet. Even though the blower must be made in halves so it will be possible to get to the impeller should need arise, the blower housing is of welded construction. So is the impeller.

The "crop duster" (photo 2) is another implement that Brandt has developed. The "dust" is for weed killing and can be any one of several different chemicals on the market. A blower forces it from the hopper through flexible rubber hoses (not shown in the photograph) to the tubular booms in the foreground, from which it is discharged into the field. The booms, located on either side of the hopper, may extend anywhere from 33 to 60 ft, depending upon the particular model. The dust is discharged through small outlets



5—TUBULAR conveyor powered by a gasoline engine provides simple, speedy way of loading threshed grain



6—BUSINESS end of the loader shows conveyor screw and the welded framework that carries outboard bearing

center in western Canada

that are spaced 2 in. apart on the bottom side of the pipe boom. When hitched behind a tractor, this machine provides a highly efficient labor-saving device to keep weeds under control.

The most famous product made by Brandt Electric, Ltd., is the "Cultiplow" (photo 3). This is a ten-tooth cultivator, outstanding feature of which is its strong welded frame. The frame is fabricated from 4-in. channels and 2-in. angles and is also reinforced with pipe members. Plows are attached to the frame through a compression spring mounting, which gives the cultivator considerable flexibility when it is working in hard or gravelly soil.

The plows are raised or lowered by means of a hand-operated hydraulic pump, which is mounted on the frame itself. Photo 4 shows details of the pump and also a close-up of welding on the "Cultiplow." Note the rugged construction of this implement.

Portable Grain Loader

Sakundiak Farm Equipment, Ltd., another Regina concern, has built up quite a reputation in the prairie provinces with its portable grain loader. This simple tubular conveyor (photo 5) when powered by a gasoline engine provides a speedy means of loading threshed grain. Basic principle of such a loader is, of course, its screw conveyor. Not only is this a welded product, but the conveyor tube is welded to the pipe-and-angle framework.

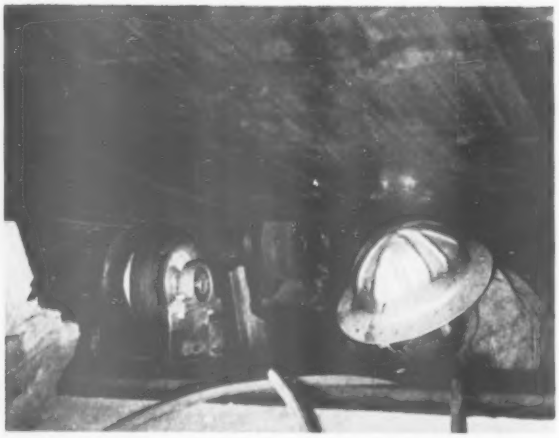
A view of the business end of the conveyor (photo 6) shows some of the details of the welded construction. The 10-in. tubing, you can see, is cut about 2 ft short of the length of the spiral conveyor. This means that the tubing will get plenty of grain but introduces a construction problem.

(Continued on page 68)

7—SCREW for grain loader (photos 5 and 6) is made by welding flame-cut steel discs to a pipe "backbone"

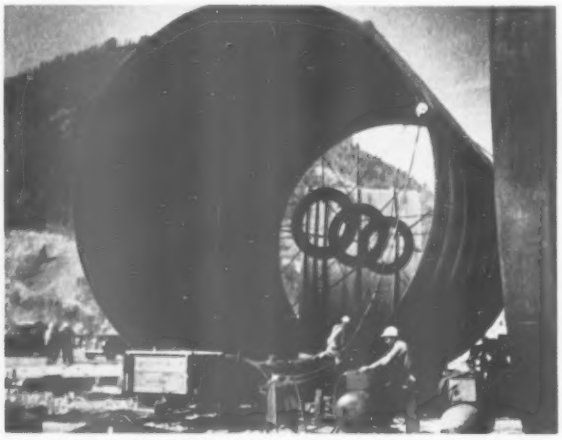
8—ALSO fabricated at Regina, Sask., is this belt conveyor for sand and gravel. It's welded throughout

1—SUBMERGED-ARC head is inside 26-ft-diameter tunnel liner and is welding a circumferential seam



2—UNDERNEATH the liner. The rollers position the belt conveyor that carries flux for pressure back-up

3—WORKMAN inspects hopper to make sure there is an adequate supply of flux to be fed to belt conveyor



4—BIG weldment slowly rotates. Legs of "spiders" are unscrewed to let them pass over welding equipment

Conveyor belt for back-up flux

FOUR pictures above show successive stages in the welding of Palisades Dam, a U. S. Reclamation Bureau Project on the Snake River in eastern Idaho. Steel liners for the power and outlet tunnels were being fabricated by submerged-arc welding with pressure back-up. The 3/8-in. steel plate was assembled into 40-ft-long sections of 26-ft diameter. The pressure back-up part of the submerged-arc set-up is new to field assembly.

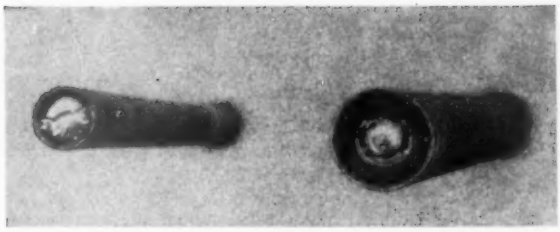
Specifications for the welding required that the circumferential joints include either double-welded butt welds or single-welded butt welds with backing strips on the outside. The pressure back-up system eliminated the necessity of back-up strip or of welding from both sides.

This method has had extensive application in shop fabrication but, until recently, has not been subjected to the varying conditions of field fabrication. Besides weather changes, training field crews in complicated automatic processes has been a major problem.

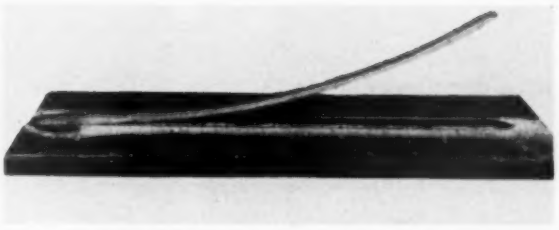
Basic element in the process is a standard submerged arc unit that works inside the liner (photo 1). Granular welding flux is held against the joint on the outside by feeding it to the underside of the 26-ft tube. Getting the flux material to the proper place in the proper quantities was no simple trick. It called for a conveyor belt running underneath the liner being welded. Rollers bearing against the shell (photo 2) maintained the proper intimate contact of flux with metal. A workman equipped with a vacuum suction device crawled into the narrow space under the large assembly in order to gather up the used and excess flux for reclamation. On the outside, another workman checked the contents of the flux hopper (photo 3) to make sure that the flux being fed to the underside would be in adequate supply.

Inside each 26-ft pipe section, "spiders" fabricated from a multiplicity of steel bars preserved the roundness of the big pipe. As the

(Continued on page 68)



PARTIALLY used electrodes show different thicknesses of coatings for conventional electrode (left) and powdered metal (right). Note crucible in latter



AMONG other advantages claimed for the powdered-metal coating is an almost self-cleaning weld. This slag lifted itself from the weld as the metal cooled

Powdered iron in the coating?

The case for . . . . . BY L. K. STRINGHAM

Chief Engineer, The Lincoln Electric Co.

Frankly, THE WELDING ENGINEER *isn't taking sides in this question of which is the better electrode: one with powdered metal in the coating or one without such metallic additions. What we do feel strongly, however, is that any responsible member of the welding industry should be permitted to have his say in our pages.*

In this issue, Mr. Stringham presents the "Pro" side for the powdered-iron coating. Are there any "Cons" in the audience? If so, will one please step forward and write us an article?—The Editors.

HEAVILY coated electrodes containing large quantities of powdered metal in their coatings yield increased welding speeds on the order of 50%. Typical currents and speeds are shown in the table below.

The basic fundamentals of the arc welding process have led inevitably to the development of powdered metal coatings. This is not an opinion but a calculated engineering conclusion.

The electric arc drawn from the end of a welding electrode performs three functions: (1) it melts the core wire, (2) it melts the coating of the electrode and (3) it melts the edges of the parts to be welded together. An increase in welding current increases the speed with which the arc can perform these duties. Up to a point.

For any given size of electrode, a maximum usable current is reached. Beyond this maximum current, a further increase causes difficulties such as an overheated electrode, breakdown of the coating, too much penetration, gouging of the parent metal, too much spatter, etc. The net effect is to impose a top limit on welding speed.

Powdered-metal coatings are designed to raise the top limit by eliminating or reducing the above difficulties.

MORE METAL, LESS HEAT

The major cause of operating difficulties that limit welding speeds is excess heat. Normally, the welding arc creates more heat than can be effectively used by conventional electrodes in the melting of the parent metal, the core wire and the coating. The excess heat is usually expended in melting an excessive amount of parent metal. The arc force throws this excess and some of the melted core wire out of the molten pool. The result may be too much penetration, gouging, undercutting and spatter. The correction for the difficulty with conventional electrodes is to cut back on the amount of current used and hence slow up welding speeds.

Electrodes with powdered-metal coatings use the excess heat available in the arc to melt the powdered metal in the coating. The difficulties of spatter, gouging, undercutting are minimized and additional metal is available for the weld. Naturally, this makes possible faster operation. If an electrode contains sufficient iron powder in the coating to supply one-third of the deposited metal from the coating and two-thirds from the core wire, that electrode can deposit metal 50% faster than the same size of conventional electrode.

Proper balance is necessary between coating and core wire. If too much iron powder is put into the coating, so much of the heat of the arc may be absorbed in the melting of the coating that there will not be enough to melt the parent metal and core wire.

LESS NEED TO "PUSH IT"

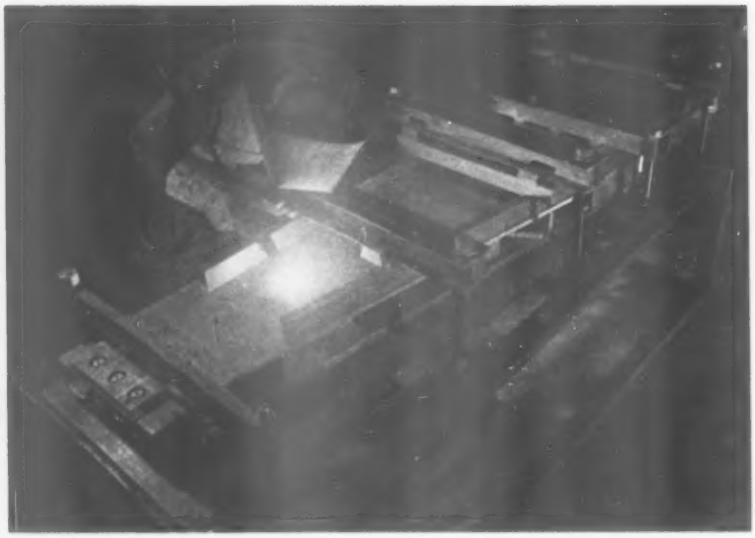
Powdered metal coatings also reduce overheating in electrodes. Overheating is an operating difficulty frequently encountered in jobs where the rate of metal deposition is the only controlling factor on welding speeds. The temptation is to push welding current up to its maximum. The danger is that the electrode will

(Continued on page 68)

TYPICAL CURRENTS AND SPEEDS

Electrode Size	Current Amps	Polarity	Fillet Size	Arc Speed Inches / Minutes
5/32"	225	AC	7/32"	15
5/32"	200	DC (+)	7/32"	12.5
3/16"	275	AC	1/4"	15
3/16"	250	DC (+)	1/4"	12.5
7/32"	300	AC	9/32"	15
7/32"	270	DC (+)	9/32"	12.5
1/4"	350	AC	5/16"	14
1/4"	300	DC (+)	5/16"	12

1—RIBS, spacer blocks and bolt bars are being welded to tie beam



2—TOP plate is being welded to the side tie beam of photo 1. Welds are made through 4 by ¾ in. slots and around the plugs seen at far left

Creamery Package welds a new package

How a well recognized manufacturer of dairy equipment shifted to the fabrication of aluminum bases for marine Diesels without halting its normal production.

GONE ARE the days when industry raised its eyebrows on hearing that a leading manufacturing company is producing an item completely different in character from the products for which it is normally geared. Wars and threats of wars have caused such news to be taken as a matter of course. Some companies, however, make the change so efficiently that it is worth taking note.

The Creamery Package Mfg. Co. has transformed a portion of its Fort Atkinson, Wis., plant from the assembly of well recognized dairy equipment to the fabrication of the world's first lightweight aluminum sub-bases engineered for heavy-duty marine Diesel engine sets designed by Packard Motor Car Co. for the United States Navy. The transformation of assembly operations to accommodate these aluminum sub-bases was accomplished without let-up or disturbance to the flow of normal production.

Designed to support a Packard marine Diesel engine and generator, each base consists of:

(1) An aluminum frame, 15-ft long, 6-ft wide and 2-ft high, of all-welded construction;

(2) A stainless-steel forged shaft;

(3) Bearing pedestals of stainless steel, and

(4) An aluminum-bronze flywheel.

One aluminum frame requires a total of 500 ft of welds, applied entirely by metal inert-gas welding. These portable units automatically feed a consumable, continuous electrode through a hand welding gun. Argon gas shields the arc. High-speed welds by this method enable Creamery Package to produce bases at the rate of one a day.

Plate and Castings Welded

Both 61S-T6 aluminum plate and 355-T51 aluminum castings are used in the fabrication of the base. Plate thickness varies from ½-in. to

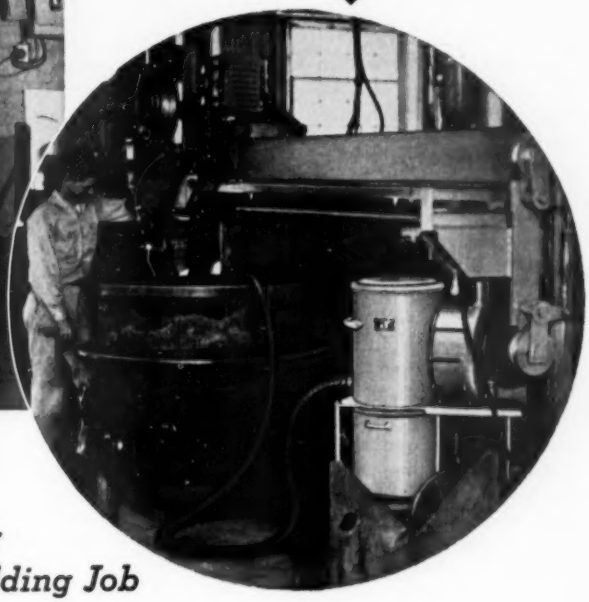
3—STIFFENER ribs are welded on one of engine rail assemblies

4—ENGINE base may be rolled or rotated for its final welding

INVINCIBLE
Flux Recovery Systems

Fully automatic flux recovery in continuous flow by Invincible Model 482.

Salvaging flux the modern way with the portable Invincible Model 460.



there's a type "Tailor Made" for your Submerged Arc Welding Job

Invincible Flux Recovery Equipment is designed to save you money. Here is how Invincibles quickly repay their cost and give you years of trouble-free service:

Save VALUABLE FLUX —Invincibles recover all unfused flux from the work, remove fine dust and fused particles, return slag-free, dust-free, fusible flux to hopper of the welder . . .

Eliminate COSTLY MAN-HOURS—Invincibles do the whole job automatically, more rapidly and efficiently than manual methods . . .

Reduce EXPENSIVE REJECTS—By removing all fine dust (flux flour), Invincibles reduce welding rejects and step up production.

Invincible users report big savings and complete satisfaction. These same results can be yours—there's an Invincible Flux Recovery Unit for any job, regardless of its size or type.

Send for folder of Invincible Flux Recovery Equipment at work. It describes and illustrates our complete line.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO
OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

¾-in. Two, three and four-pass welds are necessary in some sections, depending on the weld thickness. The plates are cut to size in the plant and ½-in. plate is formed in a special press.

Sections of the base are fabricated by welding before they are assembled as a unit. Largest of these are the left and right side tie beams, which support the greater part of the base. These are 12½ ft long, with inside welded zig-zag ribs. Beams and ribs are ½-in. plate. Spacer plugs and bolt bars are also welded to this section, photo 1. Fillet welds are ½-in. bead with one pass. Welding is done with a 3/32-in. electrode wire and an argon flow of 35 cfh.

An outside plate is then joined to the above unit, photo 2, by means of slot welds. The welds are made between this plate and the inner ribs through 4-in. long, ¾-in. wide slots. Fillet welds are also applied along both sides of the length of the ribs. These inside welds are made through hand openings cut into the plate. Covering strips of ½-in. aluminum plate the length of the side tie beam are tacked on and then fillet welded to the beam. Cross braces are also welded on, to complete the fabrication of the side tie-beam assembly.

Left and right engine rails, which support the engine itself, consist of 7-ft lengths of ⅝-in. plate, to which are welded top and bottom plates and stiffener ribs of ½-in. material. Mig welding of a rib member is shown in photo 3. Strips of 4-ft long, ½ in. plate are welded to the top of the rail (side facing the camera) and will serve as pads between the engine and the base. These welds are made in one pass with the hand gun, again using 3/32-in. wire. Argon flow for the operation was 35 cfh.

Horizontal rear, center and front beams are welded in the same manner as the units previously described. All horizontal and longitudinal fabricated sections are positioned and welded in their respective locations in a large jig set on the floor of the shop. In this jig, tack welds join these sections together to form the base as a whole unit. Six large cast aluminum blocks are welded to the underside of the base and will serve as pads upon which the entire unit will rest, and which later will be bolted to the deck of the ship. As many as three and four passes are needed to weld the pad blocks to the base.

In photo 4, the tack-welded assembly is mounted on a rotatable fixture, which may be rolled to any part of the plant for finishing operations. This arrangement makes possible easier downhand welding. Areas that have been tack-welded receive full-length welds here. Many of the joints in this assembly step require two, three and four-pass welds, indicating the strength being imparted to the unit. Shop jigs have made it possible to maintain overall dimensions to a 1/16-in. tolerance in the 15 ft by 6 ft frame.

Five Mig welding guns are used in the production line during the fabrication of these bases. The same 3/32-in. aluminum welding wire is used throughout. Amperage is 300-350, direct current. Cylinder-fed argon is used at 30-35 cfh. Welding speed averages about 2 ft a minute.

Photos courtesy Linde Air Products Co.

FARM IMPLEMENT CENTER

(Continued from page 63)

The outboard bearing is carried on a welded framework (formed from ¾-in. bar stock) that is welded to the tubing as shown.

The conveyor screw is formed by welding steel discs to a 1½-in. pipe. The discs are flame-cut to 9½-in. diameter and welded to the pipe backbone of the screw as shown by photo 7. All of this welding is done manually.

Occasionally, a screw conveyor of this type is sold to a sand and gravel contractor. When this occurs, the screw is made of somewhat heavier material and its edges are hardfaced to reduce abrasive wear. Generally for conveying such abrasive materials, however, a belt-type conveyor is employed.

Tractor Boneyard, another Regina concern, is meeting the need for such equipment with the portable belt conveyor shown in photo 8. Extensive use is made of tube sections for structural purposes. The main support is of 3-in. tubing, but 3-in. channels, 2-in. angles and ¼ by 1½ in. bar stock are used extensively.

Because of the great size of this belt-type portable conveyor, most of the work of assembling one is done in the open. The parts are flame-cut on outdoor tables and are then joined together by manual arc welding.

Photos by Canadian Liquid Air Co., Ltd.

CONVEYOR FOR BACK-UP

(Continued from page 64)

huge sections were slowly rotated for circumferential welds, the legs of the spider were unscrewed to pass over the welding equipment (photo 4).

Steel plate was delivered to the tunnel portal in 120-deg arcs rolled to shape and either 8 or 10 ft long. First, three of these units were tack welded to form a cylinder. Then stiffener rings of 6 by ⅞ in. (spaced not more than 5 ft apart) were tack welded on. A spider was attached inside the pipe at each stiffener ring. The sections were then rotated while each stiffener was continuously welded to the inside of the shell.

Longitudinal seams of each section were made by using a pressure back-up similar to that described for the girth welds. After all longitudinal welds had been made and the stiffeners mounted, the finished section was tack welded to another section and circumferentially welded by the submerged-arc process. Other units were then added until a 40-ft length was completed.

Prime contract for work at Palisades Dam was held by Palisades Contractors, Inc. Subcontractor for plate steel assembly was the American Pipe and Construction Co.

POWDERED IRON COATINGS

(Continued from page 65)

be heated to a red-hot condition by being forced to carry more current than its size warrants. A red-hot core wire will break down the electrode coating so that it cannot satisfactorily do its job. The maximum current that can be used without producing a red-hot core wire is, therefore, the limit to welding speed.

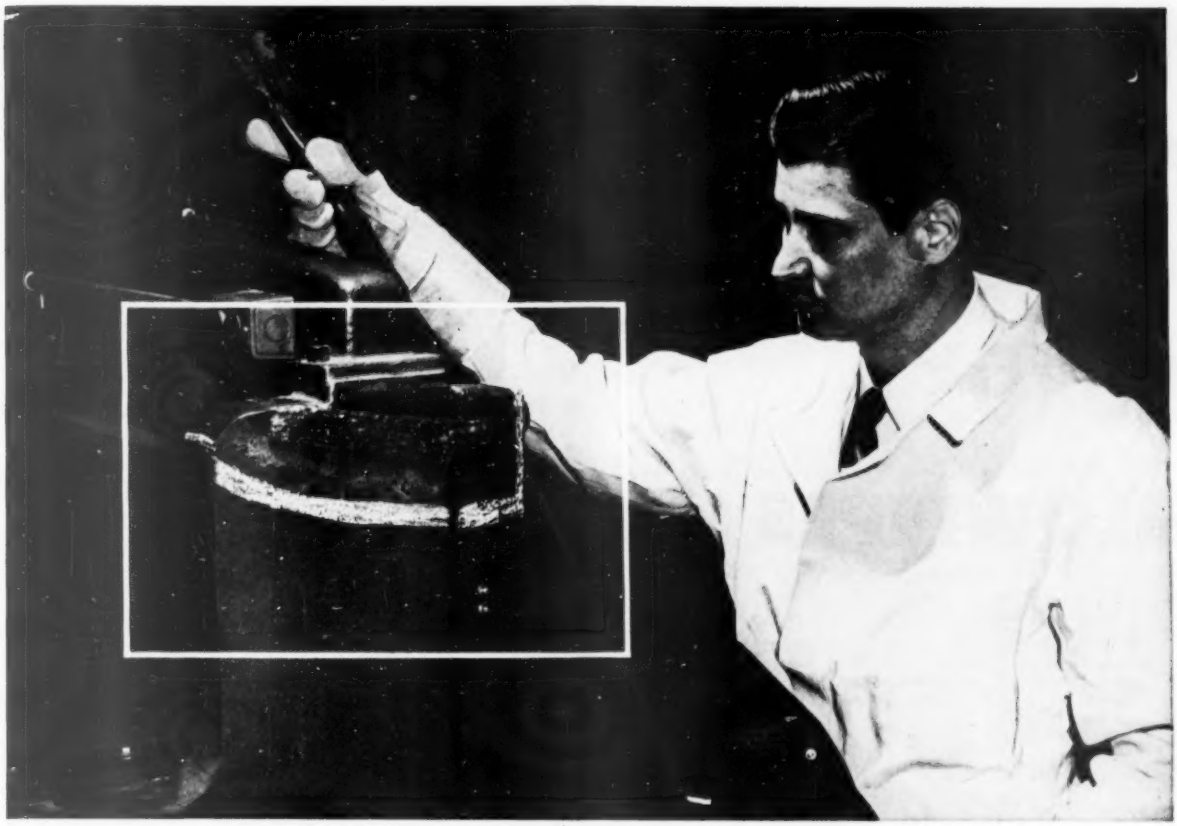
Powdered-metal electrodes effectively raise the limit on welding speeds. Because more metal is available for deposition, welding speeds can be increased without necessarily increasing currents.

For the electrode consumer, the trend to powdered-metal coatings will mean:

1. Lower welding costs through higher welding speeds.

2. Lower cleaning costs because of less spatter and undercut.

3. Smoother and more uniform welds.



Bob Riegle, welding specialist for Williams and Co., Inc., of Columbus, Ohio, welded the shear support back into serviceable condition in 3½ hours using only 5 pounds of Ni-Rod "55".

Fractured on Friday

...back Shearing on Saturday

It was a black Friday . . .

The company's 8-ft. metal shear had broken in a freak accident.

It would take weeks to replace the part and would cost several hundred dollars.

Furthermore, the time couldn't be spared — the shear had to be always ready to handle emergency orders for cut-to-size pieces of metal.

What to do?

One of the company's welding specialists examined the gray cast iron shear support, and felt confident he could repair it.

Early Saturday morning he started . . .

First, he ground the fracture open to prepare the joint for welding. Then, using a ⅛" Ni-Rod "55"® welding electrode he laid the first bead. He carefully removed the slag and peened it — repeating this procedure until he had built up enough weld to go to a 5/32" Ni-Rod "55" electrode. He built the weld up above flush — — using five pounds of electrodes altogether.

The welding job was finished in about 3½ hours. The shear was back on duty Saturday — the welder had saved time and dollars for the company!

That's the kind of job welders are doing regularly with Ni-Rod "55" and usually without pre-heat or post-heat because it gives a sound, crack-free, nonporous weld. And Ni-Rod "55" is easy to use — it's stable-arcing with a minimum of spatter to give a smooth bead contour.

If you have a special cast iron welding problem, you can always call on Inco's Technical Service Section for help. In the meantime, write for a copy of the new folder on Ni-Rod "55".

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

INCO TRADE MARK

Here's evidence of the superior flashback* resistance built into PUROX TRADE-MARK BLOWPIPES

This is an actual excerpt from a recent Salesman's Report:

"... The superintendent wanted to know what the PUROX *W-202 blowpipe's characteristics were concerning flashback. I told him to go ahead and try it. He then lit a standard welding head and placed it against a block of wood six inches square. It bit its way into the block two inches deep before the tip of the welding head began to melt off. BUT ALL THE WHILE IT KEPT BURNING WITH NO FLASHBACK...."*

We don't guarantee that every blowpipe can be maltreated this way with the same results. But that's the simple truth about the flame stability and flashback resistance of the PUROX W-202 Blowpipe. Your present welding and heating work may not demand the limits of its outstanding performance. Still the reserve that's there—if and when you need it—is your continued assurance of steady, dependable operation and your safeguard against repair bills.

See for yourself the many additional features that put the PUROX W-202 Blowpipe so far ahead of the field in economy, ease of operation, and low cost maintenance. Enjoy tomorrow's standards today. Ask your LINDE jobber for a demonstration. Or write to LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 E. 42nd Street, New York, N. Y. In Canada: Dominion Oxygen Company, Division of Union Carbide Canada Limited, Toronto.

* *"A flashback occurs when the flame disappears from the end of the tip and the gases burn within the torch or beyond the torch in the hose, usually with a shrill, hissing sound."*

—Definition from THE WELDING ENCYCLOPEDIA, *Thirteenth Edition.*

Get it from your LINDE jobber

The terms "Linde" and "Purox" are registered trade-marks of Union Carbide and Carbon Corporation.

Brinell Hardness Numbers for Various Loads

The Brinell hardness number is influenced by the applied load, the diameter of the ball and its elastic properties. In the usual procedure, a ball having a diameter of 10 mm is used with a load of 3000 kg for steels and 500 kg for after materials. However, it is sometimes desirable to use intermediate loads. The Brinell hardness numbers for loads ranging from 500 to 3000 kg are given below.

BRINELL HARDNESS NUMBERS						
Dia. of Indentation	500 KGM Load	1000 KGM Load	1500 KGM Load	2000 KGM Load	2500 KGM Load	3000 KGM Load
2.00	158	316	473	632	788	945
2.05	150	300	450	600	750	899
2.10	143	286	428	572	714	856
2.15	136	272	409	544	681	817
2.20	130	260	390	520	650	780
2.25	124	248	373	496	621	745
2.30	119	238	356	476	593	712
2.35	114	228	341	456	568	682
2.40	109	218	327	436	545	653
2.45	104	208	314	416	522	627
2.50	100	200	301	400	500	601
2.55	96.3	193	289	385	482	578
2.60	92.6	185	278	370	462	555
2.65	89.0	178	267	356	445	534
2.70	85.7	171	257	343	429	514
2.75	82.6	165	248	330	413	495
2.80	79.6	159	239	318	398	477
2.85	76.8	154	231	307	384	461
2.90	74.1	148	222	296	371	444
2.95	71.5	143	215	286	358	429
3.00	69.1	138	208	276	346	415
3.05	66.8	134	201	267	334	401
3.10	64.6	129	194	258	324	388
3.15	62.5	125	188	250	313	375
3.20	60.5	121	182	242	303	363
3.25	58.6	117	176	234	293	352
3.30	56.8	114	171	227	284	341
3.35	55.1	110	166	220	276	331
3.40	53.4	107	161	214	267	321
3.45	51.8	104	156	207	259	311
3.50	50.3	101	151	201	252	302
3.55	48.9	97.8	147	196	244	293
3.60	47.5	95.0	143	190	238	285
3.65	46.1	92.2	139	184	231	277
3.70	44.9	89.8	135	180	225	269
3.75	43.6	87.2	131	174	218	262
3.80	42.4	84.8	128	170	212	255
3.85	41.3	82.6	124	165	207	248
3.90	40.2	80.4	121	161	201	241
3.95	39.1	78.2	118	156	196	235
4.00	38.1	76.2	115	152	191	229
4.05	37.1	74.2	112	148	186	223
4.10	36.2	72.4	109	145	181	217
4.15	35.3	70.6	106	141	177	212
4.20	34.4	68.8	104	138	172	207

BRINELL HARDNESS NUMBERS						
Dia. of Indentation	500 KGM Load	1000 KGM Load	1500 KGM Load	2000 KGM Load	2500 KGM Load	3000 KGM Load
4.25	33.6	67.2	101	134	167	201
4.30	32.8	65.6	98.5	131	164	197
4.35	32.0	64.0	96.0	128	160	192
4.40	31.2	62.4	93.5	125	156	187
4.45	30.5	61.0	91.5	122	153	183
4.50	29.8	59.6	89.5	119	149	179
4.55	29.1	58.2	87.0	116	145	174
4.60	28.4	56.8	85.0	114	142	170
4.65	27.8	55.6	83.5	111	139	167
4.70	27.1	54.2	81.5	108	136	163
4.75	26.5	53.0	79.5	106	133	159
4.80	25.9	51.8	78.0	104	130	156
4.85	25.4	50.8	76.0	102	127	152
4.90	24.8	49.6	74.5	99.2	124	149
4.95	24.3	48.6	73.0	97.2	122	146
5.00	23.8	47.6	71.5	95.2	119	143
5.05	23.3	46.6	70.0	93.2	117	140
5.10	22.8	45.6	68.5	91.2	114	137
5.15	22.3	44.6	67.0	89.2	112	134
5.20	21.8	43.6	65.5	87.2	109	131
5.25	21.4	42.8	64.0	85.6	107	128
5.30	20.9	41.8	63.0	83.6	105	126
5.35	20.5	41.0	61.5	82.0	103	123
5.40	20.1	40.2	60.5	80.4	101	121
5.45	19.7	39.4	59.0	78.8	98.5	118
5.50	19.3	38.6	58.0	77.2	96.5	116
5.55	18.9	37.8	57.0	75.6	95.0	114
5.60	18.6	37.2	55.5	74.4	92.5	111
5.65	18.2	36.4	54.5	72.8	90.8	109
5.70	17.8	35.6	53.5	71.2	89.2	107
5.75	17.5	35.0	52.5	70.0	87.5	105
5.80	17.2	34.4	51.5	68.8	85.8	103
5.85	16.8	33.6	50.5	67.2	84.2	101
5.90	16.5	33.0	49.6	66.0	82.5	99.2
5.95	16.2	32.4	48.7	64.8	81.2	97.3
6.00	15.9	31.8	47.8	63.6	79.5	95.5
6.05	15.6	31.2	46.9	62.4	78.0	93.7
6.10	15.3	30.6	46.0	61.2	76.7	92.0
6.15	15.1	30.2	45.2	60.4	75.3	90.3
6.20	14.8	29.6	44.4	59.2	73.8	88.7
6.25	14.5	29.0	43.6	58.0	72.6	87.1
6.30	14.2	28.4	42.8	56.8	71.3	85.5
6.35	14.0	28.0	42.0	56.0	70.0	84.0
6.40	13.7	27.4	41.3	54.8	68.8	82.5
6.45	13.5	27.0	40.5	54.0	67.5	81.0

Diameter of Ball 10 Millimeters.
Impression Diameters to 0.05 MM.

From INDENTATION HARDNESS TESTING by Vincent E. Lysaght; published by Reinhold Publishing Corp., 1949

on the job . . .

It's in the bag!

AN X-RAY technique borrowed from the medical field speeds inspection of irregularly shaped jet engine parts in Solar Aircraft Company's plant in Des Moines, Iowa. A thin-walled rubber bag, filled with fine plastic granules and equipped with a portable vacuum pump, has tripled inspection output. The device was originally perfected to immobilize patients undergoing diagnostic or therapeutic treatment.

Normally, the bag is limp. When air is partially evacuated from the bag, it becomes pliable like putty (as in picture) and can be easily molded to any desired shape. But when air is further exhausted, the bag and its contents become extremely rigid and will hold any previously molded shape.

The bag has almost eliminated the need to build special jigs or supports for holding welded parts or castings during X-raying or to support the film during exposure. Since the device has the property of freezing when the air is removed, it can be made to serve as a universal jig and fixture.

* * *

Longest aluminum line laid with automatic welder

LONGEST aluminum pipeline ever installed, a 12-mile high-pressure line, was laid recently between the White Point gas field near Corpus Christi, Texas, and the Reynolds Metals Co. LaQuinta alumina plant. A new portable automatic welder, developed by Reynolds in conjunction with Air Reduction Sales Co., performed so rapidly that it passed the ditching machines and worked on ahead of them.

This machine welded 40-ft sections of 8⅝-in. aluminum pipe in an average time of four minutes for a five-pass weld. Suspended over the line by a side boom, the automatic welder is equipped with quick-acting clamps to grip the pipe. The Mig (metal inert-gas) process is used with a standard welding gun. When the weld is complete, the machine automatically stops, reverses itself and returns to the starting position. The clamps are then released, and the machine moves to the next weld.

The line laid near Corpus Christi is the first full-scale use of the newly developed pipe welder. Short test lines with smaller-diameter pipe were laid earlier at Listerhill, Ala., for the Alabama-Tennessee Natural Gas Co., and at Jal, N. M., for the El Paso Natural Gas Co. Both installations proved successful.

W. B. Moore, Reynolds' manager of chemical and petroleum market sales, said: "Development of an automatic method of welding has been the missing link in making aluminum competitive with steel pipe for high-pressure gas lines. I believe you will see several substantial aluminum gas line projects started in the next year or so as a result of this new welding technique."

The welds made during the laying of the 12-mile high-pressure link were subjected to pressure as high as 1,800 psi and held firmly. The 40-ft aluminum pipe sections used weigh only 320 lb while the same size section of steel pipe weighs about 1,000 lb.

The largest diameter pipe now made by Reynolds is 12 in., but the aluminum firm is planning facilities at its Phoenix extrusion plant for manufacture of pipe up to 32 in. in diameter.

Advantages of aluminum pipe for oil and gas pipelines: aluminum is non-corrosive, and is not attacked by the sulphur present in "sour" crude oil. Wrapping is unnecessary in many instances. If aluminum pipe is wrapped, it does not required cleaning after storage to remove mill scale or rust. Painting of aluminum used in overhead or exposed installations is unnecessary. The inside surface of aluminum pipe is so smooth it approaches that of glass tubing. This means much less friction and less pressure drop, with consequent savings in transmission costs.

Another major advantage is the weight differential. Aluminum weighs about one-third as much as steel, can be used for aerial river crossings and bridge crossings where steel is impractical.

Courtesy The Taylor-Winfield Corp.

Bicycle rim welding

A FORMING and welding mill built for the manufacture of bicycle rims is more than 40 ft long and includes three seam welders. This huge machine is located in the plant of the Canada Cycle and Motor Co., Ltd., Weston, Ontario. It forms the flat strip to shape, folds the edges together and welds them in continuous operations.

Weld "A" in illustration above seals the ends of the strip to the inside of the rim. Welds "B" and "C" provide rigidity and water-tightness. Flat strip 0.028 in. thick is fed from large coils into one end of the machine at 35 ft per minute. It comes off the other end as five to six completed rims per minute, depending upon the size of the rim.

The three heavy-duty welders have vertical and special tilted frames and are equipped with antifriction bearings. Current collectors carry the continuous current at high welding speed.

* * *

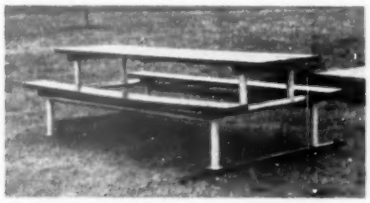
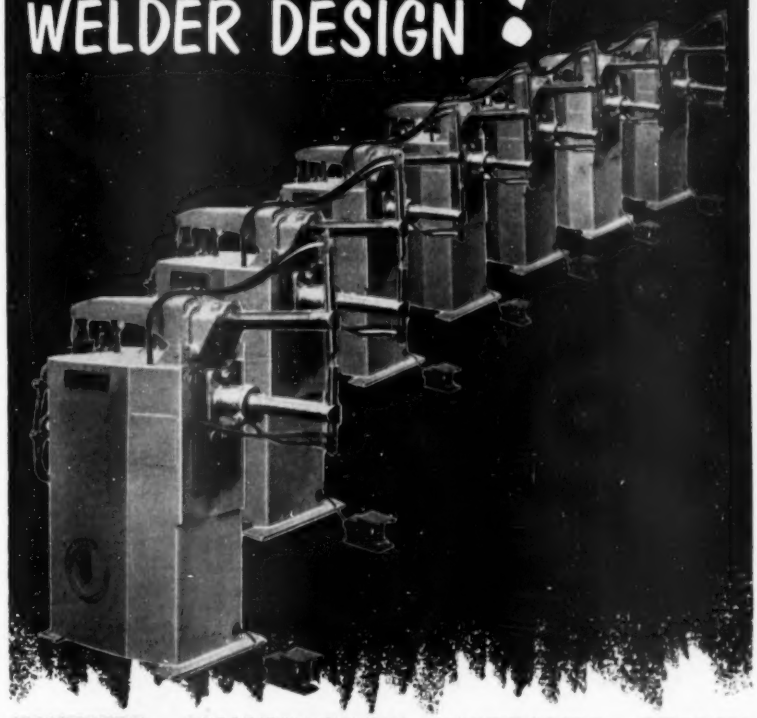


Table in the wilderness

IT TAKES all sorts of people to make a world, but we could do without the types who split up public picnic tables for kindling wood or carry them home as a souvenir of the outing. A roadside bench and picnic table that will *not* eventually end up in somebody's camp fire or back yard has been developed by the Kansas State Highway Department.

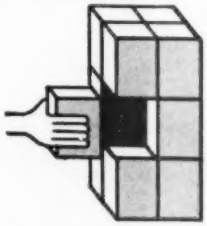
The welded steel frame of the table-bench unit was fabricated from 1¾-in. tubing. To keep the legs from sinking into the ground, feet were welded to them; the feet are simply 3 by 3 in. sections of ¼-in. plate. The benches and table tops are 2 by 12 in. planks that have been solidly bolted to the framework.

WHAT'S NEW IN WELDER DESIGN?



UNITIZED CONSTRUCTION, IMPROVED DESIGN of Federal's Rocker-Arm Spot Welder MEANS BETTER WELDS, FASTER, LOWER UPKEEP

UNITIZED DESIGN
A Federal Exclusive!



Component parts of each system are sectionized and mounted on individual, removable panels. Normal "down-time" is reduced to an absolute minimum; maintenance greatly simplified.

Federal's New Rocker Arm Spot Welders—redesigned from base to tip—to deliver highest production with a minimum of operating and maintenance costs. Feature for feature they are the outstanding low cost spot welders of this type available today.

Here's a few of the many features: Unitized Design, built in sections for easy maintenance and interchangeability; More Space, tapered frame permits greater working areas; Compact Construction, trims bulk—all lines are outside frame—easily accessible without unsightly and dangerous protrusions; Ferrule Fittings, with threaded couplings, permit quick, simple disconnect of all water and air connections; Low Loss Cylinder of new design boosts efficiency as does the new style Low Inertia, streamlined Horn Raising Lever. It's all new! It's welding efficiency at it's finest. It's another reason why welding engineers trust "Federal—First in Resistance Welding."

See Federal at Booths 172-173, Welding Show, May 5-7, Buffalo, N.Y.

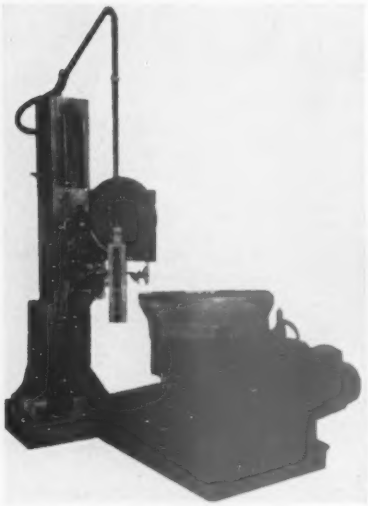
THE FEDERAL MACHINE AND WELDER COMPANY

WARREN, OHIO

Federal® WELDERS

Warco® PRESSES

New products . . .



WIDE range of table speeds offered

SMALL shop welder has many uses

CURRENT is varied by foot switch

Girth welder

A HEAVY-duty positioner mounted on a common base with a vertical column for flexible weld-head positioning is said to provide an accurate unit with a wide range of table rotary speeds. On this new "Universal" girth welder, the standard bored hole goes through the table without interference, making possible the application of hydraulics, air, water or gas into special fixturing through rotary joints. Jig-drilled and tapped holes on the table surface offer interchangeable fixture-mounting applications.

A power-operated saddle, guided by vee-type rollers, is supported by the vertical column. Arms mounted on front of the saddle impart horizontal or radial movement to welding equipment. Controls and welding cycle can be operated from a swinging pendant station.

MORTON MFG. CO., Broadway and Hoyt, Muskegon Heights, Mich.

* * *

Electrode

WELDING manganese steel and hardfacing can both be accomplished through use of this new electrode—"Wear-Arc Super WH." A low carbon content (0.35%) prevents spalling and flaking of weld deposits under conditions of severe impact, according to the manufacturer.

For use with either a-c or d-c, the electrode is said to provide abrasion resistance up to four times that of manganese steel. With it, manganese steel can be welded to manganese steel or any other type of steel with greater rigidity and strength than stainless, it is claimed.

ALLOY RODS CO., 5112 W. Market St., York, Pa.

* * *

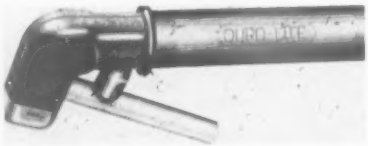
Utility arc welder

(center photo)

DESIGNED to meet needs of shops that do not require production-type capacity, the "Redi-Arc" a-c arc welder handles up to 5/32-in. electrodes and can be used wherever 220-volt, 60-cycle, single-phase current is available. It produces a stable, surge-free welding arc, manufacturer states. Built to equal or exceed NEMA or REA specifications, it can be used in sheetmetal, body, farm or home shops and in repair and maintenance departments.

MARQUETTE MFG. CO., INC., 307 E. Hennepin Ave., Minneapolis 14.

* * *



Electrode holder

LATEST addition to this firm's line of electrode holders is "Duro-Lite Model M," which weighs 16 oz. It takes electrodes with diameters from 1/16 to 1/4 in. Manufacturer states its lever action permits fast changes. All parts can be replaced by using only a screwdriver.

DURO ENGINEERING CO., 136 Park St., New Haven 11, Conn.

Rectifier welder

WIDE current range is available on a new selenium-rectifier, d-c arc welder, called the "Aircrafter." A remote foot switch is used to control current range, which is determined by position of a selector switch. Settings are: 5 to 95 amp, 12 to 180 amp and 55 to 300 amp. The welder is shut off by the same foot switch when minimum output is reached.

With this arrangement, the operator can, by varying welding current, fill in craters and control cooling rate of weld deposits. In addition to this remote control feature, the welder is said to have remarkable arc flexibility.

MILLER ELECTRIC MFG. CO., Appleton, Wis.

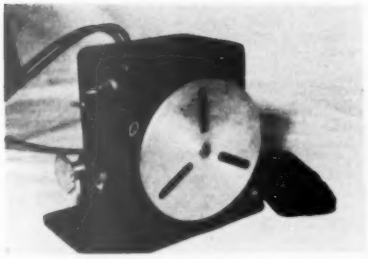
* * *

Solder melting pot

SOLDER and other soft metals can be heated and held at proper temperature in this automatic electric melting pot. Accurate temperature control is provided by a thermostat bulb immersed in the metal and protected by a cast-iron tube. Pots for solder come in three sizes—150, 750 and 1,500 lb.

Heating elements for the first two consist of spiral coils of nickel-chromium wire threaded through ceramic insulator supports to form a flexible band. Coils on the other pot are spaced and supported by refractory insulators bolted together and fastened to the heavy-alloy top ring casting.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 2099, Pittsburgh 30.



Welding turntable

SMOOTH stepless speed change from 0 to 7 rpm is provided by the "Aircrafter" bench model turntable. A greater speed ratio for this positioner can be obtained by a gear change at slight additional cost. Weighing only 20 lb, the "Aircrafter" is easily portable. Turntable is 7 in. in diameter, and speed is set by a rheostat with foot-control switch. Manufacturer claims it will carry loads up to 100 lb, if work is properly balanced.

Can be used for inert-gas-shielded-arc, gas or arc welding as well as brazing and soldering—in horizontal or vertical position.

SUPERIOR WELDING CO., 3410 E. 14th St., Los Angeles 23.

* * *

Air-control valve

SMALL four-way, two-position direct solenoid air-control valve may be mounted directly on welding guns, small jigs and fixtures, etc. Called the "Comet," it measures only 5 by 2¼ in. by 2 in. and weighs 2½ lb. It is capable of operating at 800 or more cycles per minute, according to the manufacturer. Maintenance is simplified because it has only one moving part. Pressure rating is 250 psi of air, and maximum temperature is 180 F. Exhaust is non-piped.

ROSS OPERATING VALVE CO., 120 E. Golden Gate Ave., Detroit 3.

* * *

Automatic solderer

DESIGNED for use in production soldering, this automatic machine can be operated by either a foot pedal or an electric motor. It can also be linked to already existing power supplies. A reel of solder is automatically fed into position above the work. When solder is in place, an electrically heated iron descends and melts it.

Different gages of soldering wire can be used, and the amount fed into position can be varied from 1/32 to ⅞ in. Machine can be fitted with different sizes of bits and irons.

MULTICORE SOLDERS LTD., Multicore Works, Maylands Ave., Hemel Hempstead, Hertfordshire, England.

—McGraw-Hill World News

IF IT'S A VALVE
FOR WELDING—
ROSS HAS IT

Ross
FOUR WAY REMOTE CONTROLLED
MASTER VALVE

- *Retrold Series 56E*
- *May Be Removed without Disturbing Piping*
- *For Air and Other Service*
- *Parts Interchangeable with Other Ross Four Way, Base Mounted Valves*

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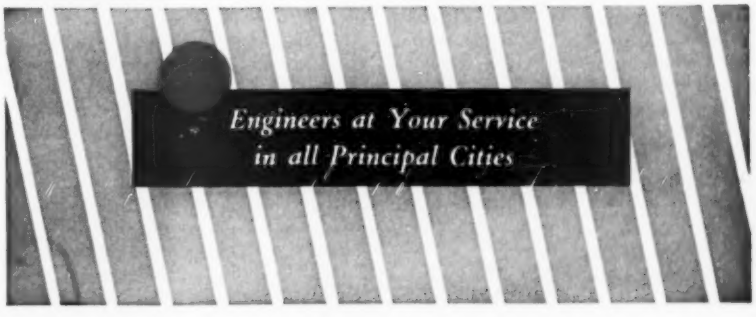
Ross OPERATING VALVE COMPANY
116 E. GOLDEN GATE AVENUE • DETROIT 3 • MICHIGAN



Positioner

DANGER of broken hoses or tangled cables is said to be eliminated with new "Hollow Kingpin" positioner. All lines are brought up through the center of the table and remain together, enabling the operator to position a weldment quickly and efficiently, manufacturer states.

This positioner is a turntable which may be tilted 135 deg, rotated 360 deg or elevated with weldment clamped in place. Available in standard sizes that handle loads up to 40,000 lb.

THE PANDJIRIS WELDMENT CO., 5151 Northrup Ave., St. Louis 6.

* * *

Torch attachments

CUTTING, welding and heating range of "Airco 800" oxyacetylene torch can be greatly extended through use of new cutting attachments and a jet-type mixer.

Attachments "Airco 1300" and "Airco 2800" cut steel up to 6 in. and 8 in. thick, respectively. Standard cutting tips produced by the firm may be used with these attachments, which use a diaphragm-type valve for control of cutting oxygen.

The jet mixer handles all welding and heating tip sizes with complete flame stability, according to manufacturer. Design features minimize sputtering, popping and flashback. Rubber sealing rings provide a gas-tight seal with hand tightening.

AIR REDUCTION MAGNOLIA CO., P. O. Box 319, Houston.

Fume collector

WELDING smoke from operations performed at a distance from regularly ventilated welding areas can be absorbed completely by this space cleaner, according to the manufacturer. Called the "Sterilshield," it also is a dust collector.

It makes use of a 1,000-cfm capacity electrostatic air cleaner, with associated power supply. Air is driven through the unit horizontally by a propeller fan. Mounted on casters for portability, the "Sterilshield" is 33 in. long, 32 in. high and 21 in. wide.

THE BAKER CO., INC., Maplewood, Me.

* * *

Welding studs

IMPROVED welding studs for the construction industry are said to provide strong, corrosion-resistant fasteners for corrugated asbestos, steel and aluminum, flat asbestos and insulation. They are also suitable for all types of curtain wall construction. All applications are from the top side of roof or outside wall.

These "Korr-Studs" have been designed to allow maximum loading of the fastener, yet allow a wide safety factor. Threads, where required, are rolled to provide additional strength. Solid flux on each stud is precision-centered to assure a good weld, according to the manufacturer. Sidelap fasteners are quickly applied from outside.

KSM PRODUCTS, INC., 321 Woodland Ave., Merchantville, N. J.

* * *

Hardfacing tube rods

Now available in tube form are hardfacing rods "Haynes 90" and "93" and "Hascrome." These alloys can be obtained in 14-in. lengths for manual deposition as well as in coils for use in mechanized hardfacing. According to the manufacturer, all three rods have excellent welding characteristics and produce sound, uniform deposits with good hardness and excellent wear-resistance properties.

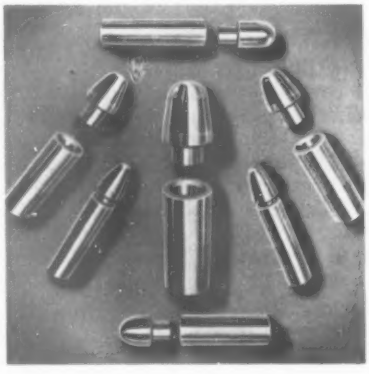
HAYNES STELLITE CO., Division of Union Carbide and Carbon Corp., Kokomo, Ind.

Blasting machine

LIGHTWEIGHT, compact design is feature of the "V. B. Junior" blasting machine for cleaning surfaces before and after welding. Entire unit weighs only 80 lb and is mounted on a stand equipped with casters. It stands 3 ft high and occupies 5 sq ft of floor space. High-power suction system picks up all abrasive and dust and conveys them to the cyclone separator. Any air compressor with 105-cfm capacity can power the blaster, which, under normal operating conditions, has an air consumption rate of 88 cfm.

VACU-BLAST CO., INC., Box 885-Jr., Belmont, Calif.

* * *

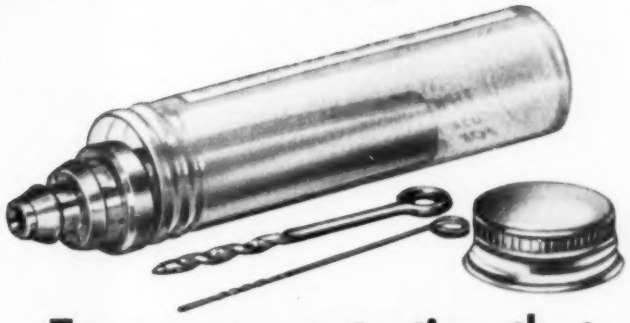


R-W welding tips

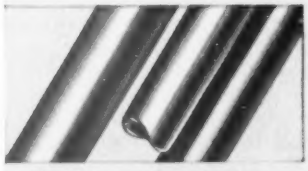
"RECAP" tips and adapter shanks for use in resistance welding enable welding face of tip to be ejected without removing entire electrode from holder. They also provide a double water seal. Because of its tapered length, the insert can be used in dies and in many restricted places where clearances are inadequate for a standard tip. Manufacturer states these tips and shanks effect savings in electrodes, electrode holders and equipment downtime.

AMPCO METAL, INC., Resistance Welding Division, 1745 S. 38th St., Milwaukee 46.

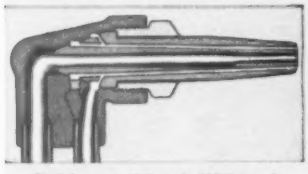
NOW...to give you MORE in the TORCHWELD® "75"



TORCHWELD "75" features that add up to better performance



Triangular arrangement of tubes for exceptional rigidity and strength. Silver brazed joints never jar loose.



Stainless steel head. Withstands severest cutting conditions. Won't distort under extreme heat.

Leakproof Diaphragm Valve is the simplest, safest, most economical type of high pressure oxygen control ever designed.

(Not shown.) Sure-grip grooved and fluted handle. Natural action high pressure control lever that gives utmost sensitivity and accuracy of control.

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Two-way protection that multiplies tip life 3-5 times

The construction *FACTS* behind Torchweld "75" design bear out its record of longer life, better performance, reduced costs.

But now a new protective measure will increase the already great value you get from the Torchweld "75".

We are now packaging each "75" Cutting Tip in a protective plastic container. Not so much for safety in shipping—*but as an invitation to cutting operator to return each tip, when not in use, to this plastic container.*

This simple, easy measure will keep the finely finished seating surfaces of the tip from contact with dirt and grit, will preserve it from careless handling . . . will multiply the useful efficient life of the tip *three to five times over.*

In addition, two NCG tip cleaners are packed with the tip, for the proper cleaning of the preheat and high pressure oxygen passages. Another measure that will greatly lengthen tip life.

We think enough of "75" Cutting Tips to spend a lot of care in their preparation. We think enough of your investment in these tips to want to protect it to the end. Compare the Torchweld "75" Cutting Torch —and tips—with anything you have used before. Contact an authorized NCG dealer, or NCG district office, or write the address below for a no-cost, no-obligation demonstration. Don't wait, do it today.

NCG®

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NATIONAL CYLINDER GAS COMPANY

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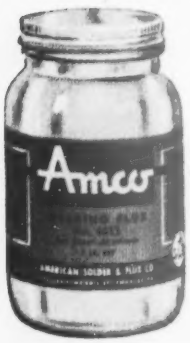
Branches and Dealers from Coast to Coast

good welding STARTS

with the RIGHT flux

Get stronger welds faster on Aluminum, Stainless and all non-corrosive steels . . . at lower cost, with these AMCO Fluxes.



It's easy to get good welds on every job. Simply select the proper AMCO Flux. Here are two specialized production speeding fluxes.

FOR ALUMINUM: AMCO 4013 effectively dissolves oxides . . . assures thorough, rapid melting and spreading of rod. Prevents reoxidation.

FOR STAINLESS: AMCO 433 completely removes oxides and surface film quickly. Provides a smooth, firm bond. Eliminates reoxidation of rod and base metal at welding temperature.

Welds produced are strong . . . clean. Costs are cut. Get the full story of the many advantages of these fluxes.

● *Tell us your welding problem. We'll recommend the flux. No obligation. Write:*

AMERICAN SOLDER and FLUX CO.

TRENTON AVENUE AT NORRIS ST. - Dept. W., PHILADELPHIA 25, PA.

RUEMELIN *Welding Fume Collectors*

Illustrating Ruemelin Fume Collectors in action. Part of a group of sixteen collectors at plant of Sterling Wheelbarrow Co., Milwaukee.

Collects fumes at the source! Counterbalanced inlet hood stays in working area automatically. Hoods have great lateral and vertical range for table, positioner or floor use. Thousands in every day service. Write for bulletin 37-E.

RUEMELIN MFG. CO.

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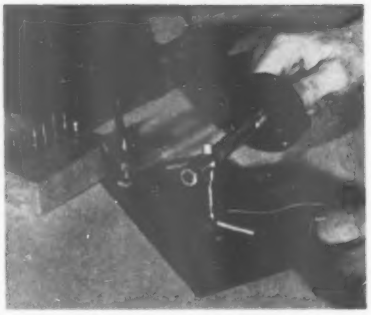


Spot solderer

CARBON-tipped spot solderer operates on low voltage supplied through an a-c, single-phase transformer. This is said to give intense concentrated heat the moment tool touches the work. Heat shuts off automatically when contact is broken. In addition to the end fitting, the tool can be fitted with two carbon tips at angles. Shield-like handle protects operator against the heat.

NEWAGE INTERNATIONAL, INC., 235 E. 42nd St., New York City 17.

* * *

Projection welder

HIGH welding pressure and fast ram action are combined in this new projection welder. It is particularly suited for welding light metals and for other applications that require high pressures and quick follow-up. Units are rated from 5,000 to 18,000 psi over a size range from 250 to 500 kva.

Novel ram design combines low inertia with low-friction motion. The ram is mounted in an aluminum frame, which is guided on two round-column vertical shafts by sleeves incorporating multiple linear ball bearings.

Units have welding strokes over a ½ to 2-in. range and may be had with an adjustable retraction stroke providing 3 to 6 in. additional travel. They are available with standard throat depths of 12 to 48 in. in 6-in. steps.

UNIVERSAL WELDER CORP., 2557 E. 79th St., Cleveland 4.

* * *

Flux

ALL-purpose "Uni-Flux" is for use in all types of gas welding and brazing. Manufacturer states no cleaning is required with this flux—it cleans as it is used. It produces an inert atmosphere around the weld area that keeps oxygen away from such foreign matter as dirt, grease, etc., which float away with wetting action of melted flux.

ANDCO, INC., 235 Thorne Ave., Orchard Park, N. Y.

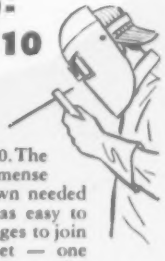
FLOWLINE®
WELDING FITTINGS
Stainless Steels · Monel · Nickel · Aluminum
4027 stock items
You can plan for economical, efficient butt-welded corrosion piping with assurance of quick availability of FLOWLINE Fittings. Delivery can be made from stock by leading distributors. Made in sizes ½" through 12" — Schedules 5S, 10S, 40S, 80S — Stainless Types 304, 304L, 316, 347; Monel, Nickel, Aluminum. Seamless fittings with all the plus values . . . at no extra cost.
WELDING FITTINGS CORP.
NEW CASTLE, PENNSYLVANIA
World's Largest Manufacturer of Stainless Welding Fittings
Remember
Forget
FLOWLINE
WELDING FITTINGS
CORROSION
PIPING PROBLEMS

8'4" x 44" galvanized manifold welded with Ampco-Trode 10

Long-lasting, tough welds on galvanized sheet

a cinch with

AMPCO-TRODE* 10



Here's another tough job solved with Ampco-Trode 10. The fabricators of the immense air duct system shown needed an electrode that was easy to apply at low amperages to join galvanized iron sheet — one that had mechanical properties similar to the base metal. They needed a deposit that resists atmospheric corrosion and corrosive fumes. Ampco-Trode 10 passed all these requirements easily.

And that's not all! Here are the other advantages you get by welding galvanized sheet with Ampco-Trode 10.

1. Lower amperages mean minimum burn-off of the zinc coating adjacent to the weld. You get maximum corrosion-resistance.

2. Weld metal is free-flowing and easy to handle — practically no undercutting.

3. Deposit has high strength and ductility — provides good bond.

4. Burn-through is practically eliminated. Deposit is smooth — looks good.

Use Ampco-Trode 10 on your next galvanized welding job for lower costs, faster-welding, top-grade deposits. Check with your Ampco distributor or write us today.

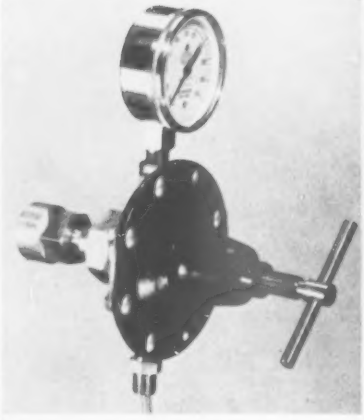
*Reg. U. S. Pat. Off.

AMPCO®

W-123

AMPCO METAL, INC.

Dept. WE-5 • Milwaukee 46, Wis.
West Coast Plant, Burbank, California



Oxygen regulators

NEW "8900" series of oxygen cutting and welding regulators affords greater flow capacities. The series is designed for use with gases supplied by pipeline systems using comparatively low pressures and supersedes this firm's "8600" series.

Steady gas pressure is maintained regardless of fluctuation in line pressure, thus eliminating need for frequent adjustment. Regulators are of inverse-type design and feature novel seating arrangement that requires no nozzle.

AIR REDUCTION SALES CO., 60 E. 42nd St., New York City 17.

* * *

Open-mesh abrasive

"SAND Screen" is name of new non-clogging, open-mesh abrasive. The screen-like abrasive is coated on both sides with silicon-carbide grain. Its open-mesh construction reduces loading to a minimum by permitting residue to flow through myriad openings. It can be used on both sides.

"Sand Screen" can be used wet or dry, for machine or hand operations. It comes in full sheets, cut sheets and discs, in grit sizes of 180 and finer. Standard 50-yd rolls up to 18 in. wide can also be furnished.

THE CARBORUNDUM CO., Buffalo Ave., Niagara Falls, N. Y.

It's the CONNECTION that counts!

cam-lok

cable connectors

proved:

"LOWEST RESISTANCE OF ALL TESTED!"

1 — "Connects" easily and tightly
2 — "Disconnects" easily and quickly
3 — Gives positive contact
4 — Insures time and money-saving interchangeability
5 — Eliminates arcing and burning

With the same cable, current carrying ability is limited only by the connectors. That's why a noted welding equipment manufacturer tested various makes of connectors. Under a 400 ampere load, the Cam-Lok Connector showed negligible resistance . . . only 10.6 millivolt drop . . . lowest of all connectors tested!

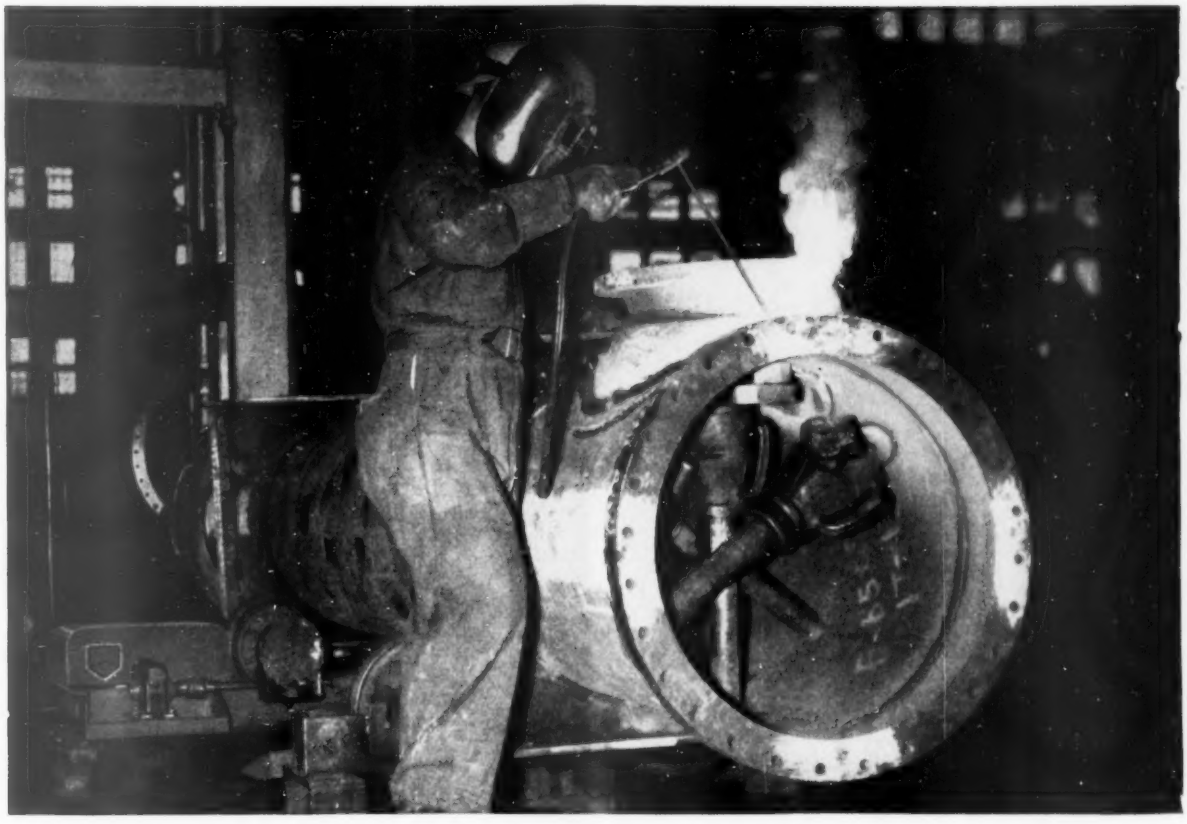
Are connectors the weakest link in your welding lines? Get trouble-free Cam-Lok for the most perfect contact possible. Just two interchangeable sizes connect all cables from No. 1 through 4/0.

See Our Booth 146
Welding Show—Memorial Auditorium
Buffalo—May 5-7

WRITE FOR FREE LITERATURE TODAY

cam-lok

DIVISION OF EMPIRE PRODUCTS, INC.
P. O. BOX 98-B, CINCINNATI 36, OHIO



This welder can weld up to 50% more than he used to!

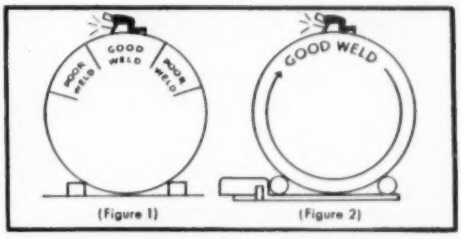
With Worthington turning rolls any welder can get better welds and turn out real footage

No problem to boost welding footage as much as 50% when you use Worthington Turning Rolls.

Previously the welder was forced to waste lots of time by having to crawl over cylindrical vessels, turn them by hand or wait for crane and hoist service.

With Worthington Turning Rolls at work his footage is soaring and he produces neater, stronger welds with less effort. Now, *power* turns the vessel at any selected welding speed as he quickly spots longitudinal seams or continuously welds circumferential seams.

To find out where you can see a nearby Worthington Turning Roll, just ask us. For more data, ask for Bulletin 228. Worthington Corporation Positioning Equipment Division, Plainfield, N. J.



WHY WORTHINGTON TURNING ROLLS INSURE BETTER WELDS

Unless the work is turned continuously, good downhand welding is obtainable only in small area (Fig. 1). With a Worthington Turning Roll, downhand welding is assured for the complete circumferential seam (Fig. 2) as well as all longitudinal seams (either by manual or automatic welding).

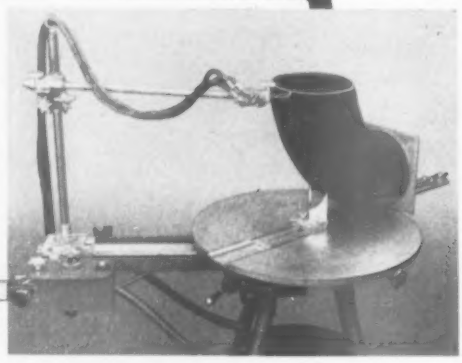
Y.2.1

WORTHINGTON

Welding Positioners
Turning Rolls

SEE US AT BOOTH 67-69 AT THE WELDING SHOW IN BUFFALO, MAY 5-7

HERE'S HOW TO
Save
WELDING FITTINGS



VERNON
"Universal" FLAME CUTTER

Use this new precision "Universal" Flame Cutter for re-working, reconditioning and salvaging all types of new and used welding ells, tees, flanges, reducers, etc. Makes extremely clean cuts . . . no cleaning or hand fitting required. Adjustable degree plate permits fitting to be cut at any angle. Has unitized control panel and unitized gas control valve.

Re-cutting a 6" 45° elbow, showing use of the adjustable degree plate.

Write for Bulletin FC-2

WHAT IT DOES

- Shortens ells, tees, flanges, reducers, etc.
- Miters welding neck flanges.
- Re-cuts and bevels used ells, tees, swedges, returns.
- Reconditions welding neck and slip-on flanges.
- Reams extra heavy fittings to standard.
- Cuts small miters . . . 22½° or less.
- Cuts holes in blanks for slip-on reducing flanges.
- Cuts and bevels short pieces of pipe to 36" diameter.
- Makes swedges out of welding caps.
- Cuts miter elbows.

Vernon PIPE CUTTING PANTOGRAPH
Vernon "Universal" FLAME CUTTER
Brown STEEL VALVES
Vernon-Ormeco TUBE EXPANDING MACHINE

VERNON TOOL CO., LTD.
1093 Meridian Ave. Alhambra, California
P.O. Box 7555 Houston 7, Texas

NOW... get new, reinforced
NU-TEX
DEPRESSED CENTER
DISK WHEELS

FOR FASTER, SMOOTHER CUTTING, roughing and grinding. Special, built-in resiliency provides smooth, cushioned cutting action . . . reduces bouncing . . . holds wheel in close contact with work. Cushioned action distributes pressure evenly . . . makes every inch of surface travel an inch of productive cutting . . . speeds up work with either portable or bench-type grinders.

FOR LONGER LIFE . . . LOWER COSTS. Bonded together with an extremely tough resin for added durability. Textile reinforcement provides maximum on-the-job safety . . . extra protection against breakage . . . longer life under continuous operation.

FOR A WIDE SELECTION . . . PROMPT SERVICE. Nu-Tex Depressed Center and Straight Disk Wheels are now available in popular diameters and thicknesses for all types of finishing. Grades range from 0 (hard) to 6 (soft). Write for complete details. Atlantic Abrasive Corp., 540 Pearl Street, South Braintree 85, Mass.

ATLANTIC ABRASIVE CORP.
South Braintree 85, Massachusetts

Flash trimmer

PURPOSE of this machine is to remove flash from inside and outside of thick-wall welded rings and cylinders. Thickness capacity of the vertical flash trimmer is ¼ to ¾ in.; minimum inside capacity is 6 in., maximum outside 24 in. It is made in sizes for trimming 4, 7 and 10-in. lengths of work.

Machine is hydraulically operated. Piece to be trimmed is placed over the inner clamp member and ram. The cycle is started by a foot-operated button. The inner ram member moves forward to clamp the cylinder. Both rams automatically cut on the draw-cut downward stroke. At end of stroke, inside ram and clamp dies move to unclamp position, rams returning to load position.

MORTON MFG. CO., Broadway and Hoyt, Muskegon Heights, Mich.

* * *

Spot welder

NEW spot welder is designed for heavy-duty, continuous-production welding. It operates on 220-volt, 60-cycle, single-phase, a-c power. The lower arm is adjustable, and the machine is foot-operated. Electrode diameter is 1 in. on all series. "Series 15, 20," and "30" have throat depths from 12 to 30 in., "series 40" from 12 to 36 in. Series number denotes respective kva rating for each of the four lines.

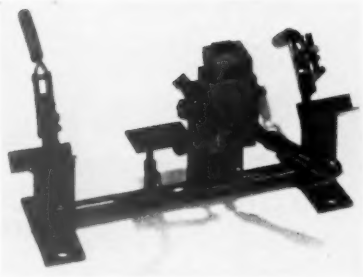
BIRDSELL MFG. CO., INC., 750 San Antonio Rd., Palo Alto, Calif.

* * *

Pull clamp

NEW pull clamp with hook has two major applications: (1) it can be used to pull in regular fashion—inserted into a ring or strap—or (2) it can be hooked over an angle iron. Recommended pulling force in the former use is 100 lb, in the latter 200 lb.

LAPEER MFG. CO., 3056 Davidson Rd., Lapeer, Mich.

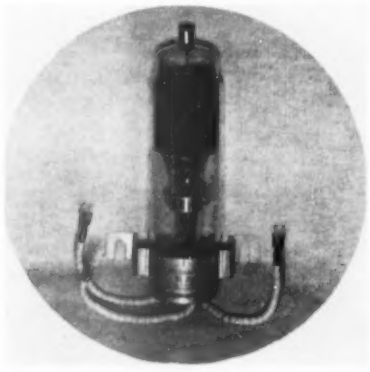


Bench welding fixture

LATEST development in the "Caddy" arc-welding accessory line is the "L-145" bench fixture. It is used in making production connections of welding cable to accessories and in splicing such cable. Quick-acting clamps lock cable into position in the welder. An adjustable platform is said to make installation of accessories quick and easy. Mold changes for cable can be made in seconds.

ERICO PRODUCTS, INC., Caddy Arc Welding Accessory Division, 2070 E. 61st Pl., Cleveland 3.

* * *



Thyratron tube

DESIGNED for welding controls and regulated rectifier applications, this new high-current thyratron has a bracket base for panel mounting. Designated "NL-760P," the tube has a 6.4 amp d-c and 77 amp peak rating. Other rating details: filament voltage, 2.5 volts; filament current, 21 amp; peak inverse voltage, 1,250 volts.

NATIONAL ELECTRONICS, INC., Geneva, Ill.

* * *

Hand grinder

VARIABLE speeds from 700 to 50,000 rpm are available on this new hand grinder, called "Ultra-Flex," for actuating wheels and discs from 1/16 to 7 in. in diameter. A hand dial controls the flexible drive shaft and speed range. The grinder has a 1-hp, three-phase motor with a vee-belt pulley drive. It has no gears.

METAL REMOVAL CO., 1546 N. Orleans St., Chicago 10.

Page Welding Wire

Now—a new line-up of PAGE welding wire in coils, reels, packages

• Here are some of the ways PAGE welding wires are packaged to protect them during shipment and to make it easy for you to handle and stock them. Two new packages are Leverpaks and pallet-mounted coils.

LEVERPAKS • Here's one of the best containers for coils up to 16" ID. It's light-weight, but durable. It is sealed air-tight and is packed with moisture-absorbing substance to reduce corrosion. Release safety catch, pull lever, and the whole top comes off. It's just as quickly resealed. Leverpaks can be rolled easily. They stack perfectly and take a minimum of floor space. They cost you nothing extra and have many re-uses.

PALLET-MOUNTED COILS • If you have a fork-lift truck, you'll like PAGE'S new pallet-mounting of 22" ID coils. Steel strapping and paper wrapping protect coils and hold them securely. You can run them in and out of freight cars and trucks, and spot them in your plant.

AUTOMATIC WELDING WIRES • **Inert Gas**—Six PAGE-ALLEGHENY stainless grades in .035", .045", and .0625" diameters. Precision thread-wound on 25-lb. non-returnable reels to fit popular arc welding machines. **Submerged Arc**—PAGE Stainless in wire diameters from 1/32" to 5/16", plain or copper coated. In layer-wound coils or 22" or 24" mill coils.

GAS WELDING RODS • In a variety of analyses: stainless, Armco, medium and high carbon, and manganese or naval bronze.

Warehouse stocks in Chicago, Denver, Houston, Los Angeles, San Francisco

Write our Monessen, Pa., office for literature and prices

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Page Steel and Wire Division
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Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

GAS shielded Arc

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

It's this simple. Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 each gives up to 2000 readings

Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
250	388	900	1450	2000

Also available in pellet or liquid form

FREE —*Tempil° "Basic Guide to Ferrous Metallurgy"* — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

Tempil° corp.
Literature Dept.
132 WEST 22nd STREET
New York 11, N. Y.

VISIT OUR BOOTH #144 AT THE WELDING AND ALLIED INDUSTRY EXPOSITION, BUFFALO, MAY 5-7

NEW PRODUCT BRIEFS

Parallel clamps are said to withstand punishment of the toughest clamping jobs. Available in seven sizes with openings from ⅝ in. to 9½ in. PRECISION TOOL & MFG. CO., 1305 S. Laramie, Cicero 50, Ill.

* * *

Panoramic exposure shield is designed to permit safe handling of strong radioactive sources for three requirements: exposures in internal locations; radiography where electric power is not available; panoramic exposures. TECHNICAL OPERATIONS, INC., 6 Schouler Ct., Arlington, Mass.

* * *

Telescoping handle bars permit this all-purpose unit to be changed from a hand truck to a platform truck in just a few seconds. The all-welded unit has a capacity of 900 lb as a hand truck, 1,700 lb as a platform truck. UNIVERSAL WELDING AND ENGINEERING CO., 1310-14 Clark St., Racine, Wis.

* * *

Lift truck has telescoping platform that can be raised to a height of 19½ ft. When lowered, the platform is 5 ft 2 in. off the ground. Platform is 34 in. and travels 98 in. BARRETT-CRAVENS CO., 4629 S. Western Blvd., Chicago 9.

* * *

Brighter finishes on a wide range of metals are said to be produced by a new multiple-purpose barrel-finishing compound called "Honite Multi-Burnish." MINNESOTA MINING & MFG. CO., 900 Fauquier St., St. Paul 6, Minn.

* * *

Loads up to 5 tons can be raised up to 42 in. by means of a new hydraulic lift table, the surface of which is smooth ¼-in. steel plate. Another "Weld-Bilt" portable lift table can accommodate heavy jigs up to 2,000 lb. WEST BEND EQUIPMENT CORP., 348 Water St., West Bend, Wis.

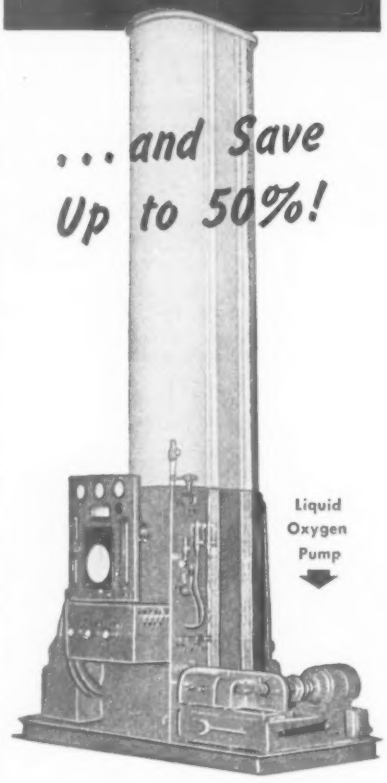
* * *

One-ton chain hoist is non-magnetic and corrosion and spark-resistant. Hoist is of the spur-gear, ball-bearing type. Chain is proof tested at 4,000 lb. AMPCO METAL, INC., 1745 S. 38th St., Milwaukee 46.

* * *

Heavy-duty air cylinders are especially suited for automation applications as well as for general use on welding machinery, conveyors, machine tools, etc. THE S-P MFG. CORP., 12415 Euclid Ave., Cleveland 6.

NOW-Make Your Own Oxygen and Nitrogen in One Generator



. . . and Save Up to 50%!

With INDEPENDENT'S newly-designed generators, you can make your own high-purity oxygen and nitrogen from the free air . . . and in the same generator.

You reduce costs up to 50% by eliminating handling costs . . . vaporizing costs . . . evaporation losses . . . residual losses . . . and transportation costs.

INDEPENDENT Generators are available in any capacity, any purity and any pressure. Put your oxygen-nitrogen problem up to us . . . our engineering department will gladly submit recommendations . . . no obligation, of course!

INDEPENDENT ENG. CO., Inc.

CONSULTING · DESIGNING · RESEARCH

O'FALLON 5, ILLINOIS

Plastic safety goggles are said to afford protection against molten metal, sparks, etc. The "Stac-Vent" is said to embody a new principle in goggle ventilation—fogging is prevented by drafting off warm, moist air from the top and center of the goggle (where it normally accumulates) just as a chimney drafts off smoke. WATCHEMOKET OPTICAL CO., 232 W. Exchange St., Providence, R. I.

* * *

Alloy steel for use in high-stress and high-temperature operations is now available in seamless tubular form. "Unversal Cyclops Uniloy 19-9DL" has been produced in welded tube form for some time. THE BABCOCK & WILCOX CO., Tubular Products Division, 161 E. 42nd St., New York City.

* * *

All-purpose abrasive wheel for roughing and finishing many materials in one operation is the "Flextex." New line consists of mounted points, straight wheels, depressed-center discs and cut-off wheels for weld grinding, polishing, etc. METAL REMOVAL CO., 1546 N. Orleans St., Chicago 10.

* * *

Designed for heavy-production use is the "61 Universal" backstand idler, an attachment for all types of wall, bench and floor coated-abrasive operations. It permits belts of same length to be employed with contact wheels of various diameters. THE CARBORUNDUM CO., Buffalo Ave., Niagara Falls, N. Y.

* * *

Vise that also serves as a clamp—it can be held while working—is the new "Ava Quick-Action" tool. Can be used horizontally or vertically in welding, jigging, etc. EVANSTON EQUIPMENT CO., 33 Warren St., Newark 2, N. J.

* * *

Dust collector has a dust drawer with a capacity of 7 cu ft. Air capacity in the three models ranges from 300 to 11 cfm, depending upon the power plant. Each of the units is of the cabinet type—28 in. square and 66 in. high. TORIT MFG. CO., 270 Walnut St., St. Paul 2, Minn.

* * *

Steam line is an integral part of "Unitrace" pipe, which is for use in handling sluggish chemicals or tricky solutions. Heated lines are needed to prevent such products from solidifying or crystallizing. ALUMINUM CO. OF AMERICA, 720 Alcoa Bldg., Pittsburgh 19.

Make faster,
stronger welds with

Bridgeport No. 192 Low Fuming Bronze Rod

When this cast iron bearing pedestal cracked open, its 250 hp motor and a 4200 psi extrusion press pump had to shut down in a hurry. A new pedestal meant a delivery wait plus a lot of heavy work, while a full production schedule called for immediate repair.

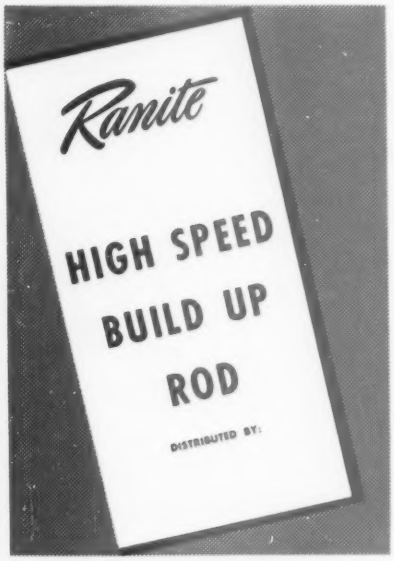
Within a matter of hours, braze welding with Bridgeport No. 192 Low Fuming Bronze Rod had this crucial unit back on the line. The job was done quickly, completely, and on the spot, without moving a single piece of heavy equipment. Later inspection showed the braze welded crack to be stronger and less brittle than the original pedestal casting.

Braze welding requires no long preheating or cooling, is recommended for building up worn surfaces and regular production of fabricated parts as well as casting repair. Bridgeport's booklet "Bronze Welding Alloys," tells the complete story. Write for your copy today.

BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., Indianapolis, Ind., Adrian, Mich.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF
BRIDGEPORT BRASS

FACTS . . . of interest to you



RANITE Type "A" (Blue tip electrode, 25-30 rockwell hardness) used for many years by welders to face shafts, gears, tractor rails, etc., has now been SPEEDED up so that it makes a much better surfacing rod for all the old jobs as well as a new time-saving build up rod for many new applications.

Write for your copy of this new FORM "A" giving application details. This rod will help you reduce costs, speed up maintenance work, and produce far better wearing characteristics.

For real service let us put you in touch with the nearest RANITE distributor.

RANKIN MANUFACTURING CO.

3072 WEST PICO BLVD. LOS ANGELES 6, CALIFORNIA

"WE CUT REWORKS 94% with DryRod Electrode Oven!"

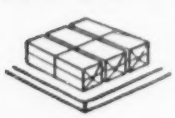
When 1 out of 3 welded hydraulic fittings were rejected at a leading Milwaukee machinery plant*, engineers blamed *moist electrodes.* Installing a low-cost DryRod Electrode Oven to store all unpackaged low-hydrogen rods, this company got *immediate* improvement . . . faster, better welds . . . few rejects. Their welding engineer said, *"DryRod successfully solved our welding porosity problem. With it we've been able to cut our reworks from 30 pieces to less than 2 per hundred!"*

Get your money's worth

You pay a premium for stainless steel, low-hydrogen, and other mineral-coated electrodes. Preserve that "baked-in" quality with DryRod Electrode Oven. Ask your welding supply dealer, or write direct for free folder.

*Name on request X-DR-12

Cut costs 4 ways with DryRod Method!



1 Store sealed cartons in warm, dry place.

2 Place unpackaged electrodes in DryRod Oven and withdraw as needed.

3 Locate DryRod as close to welding operations as possible.

4 For flexible, large-volume storage, stack ovens with compact DryRod Stands.

DryRod DIVISION OF **Phoenix Products Co.** 4215 N. 27TH ST. MILWAUKEE 16, WIS.

Letters should be addressed to: The Editor, WELDING ENGINEER, 520 N. Michigan Ave., Chicago 11, Ill. No letter will be published unless signed, but your name will be withheld if you request it.

Liked March editorial

Dear Sir:

I liked the March editorial on "Ignorant Ingenuity" even though your example in the field of pressure vessels is overdrawn justifiably in caricature fashion.

The daring ingenious ignoramus contributes greatly to progress, and his methods are akin to those used by Thomas Edison and many other famous experimenters. When they don't *know*, they *try*, using the variables at their command in different combinations until, if they are lucky, they hit on one that works. They find out *how* before they find out *why*.

So again I compliment you.

Sincerely,
H. C. Boardman
Chicago Bridge & Iron Co.
Chicago

Dear Sir:

Just a note of congratulations on your very excellent editorial, "Ignorant Ingenuity," in the March issue of WELDING ENGINEER. This is parallel to our thinking as evidenced by the letter Mr. Lincoln wrote to you. Many others also feel the experts are handicapping progress with their continued suspicions toward welding.

Very truly yours,
A. F. Davis
Vice-President
The Lincoln Electric Co.
Cleveland

Mr. Davis refers to the letter from J. F. Lincoln, president of The Lincoln Electric Co., which was published in the April "Letters to the Editor" column.

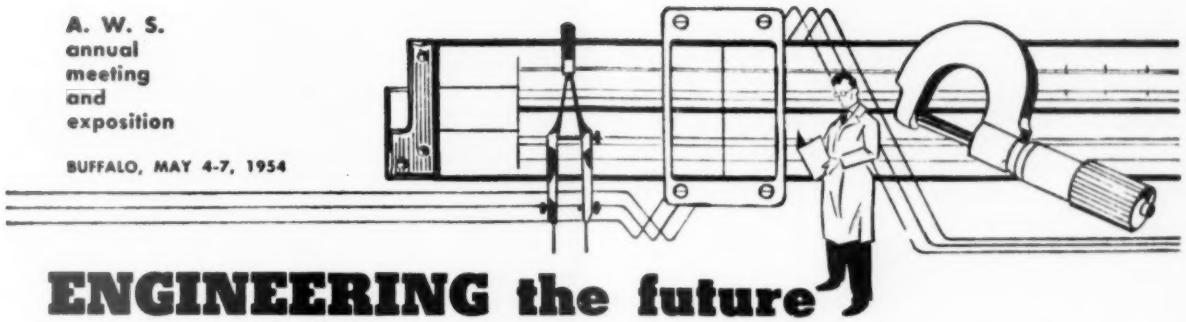
Dear Sir:

I read your editorial, "Ignorant Ingenuity," in the March issue of WELDING ENGINEER and want to congratulate you on the thoughts expressed, which are very true.

Cordially yours,
Van Rensselaer P. Saxe
Baltimore

A. W. S.
annual
meeting
and
exposition

BUFFALO, MAY 4-7, 1954



ENGINEERING the future

The future progress of your industry could well be affected by the National Spring Technical Meeting and Welding Exposition of the American Welding Society.

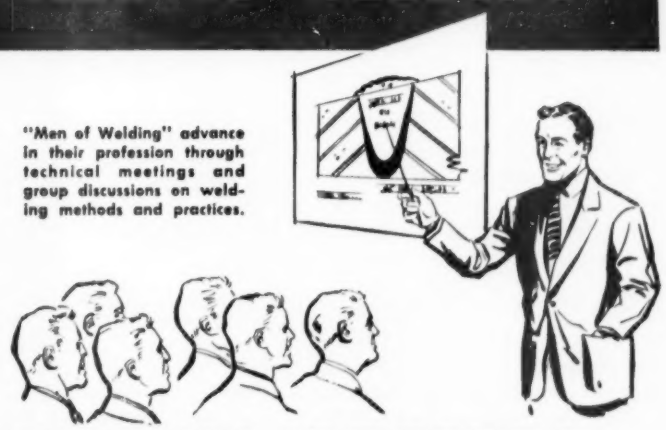
Leading authorities have prepared reports on many phases of welding engineering, procedures, metallurgy, materials selection and plant maintenance. Product design and manufacturing efficiencies will be important subjects of discussion by A.W.S. members and guests in attendance.

If your firm is using production or maintenance welding of any sort, these A.W.S. spring events are important to your management, your supervisors and individual members of your engineering personnel. May we suggest that you consider attending personally or sending a representative?

A. W. S. Builds "MEN OF WELDING"

There are 66 active local sections of A.W.S. covering the entire United States. The 9,683 members of A.W.S. hold monthly technical meetings and plant visitations where they observe practical solutions to typical welding problems and study new welding methods. They receive accurate information on welding design, fabrication and maintenance through discussions with the best welding minds in the nation and authoritative printed reports.

"Men of Welding" advance in their profession through technical meetings and group discussions on welding methods and practices.



AMERICAN WELDING SOCIETY

A powerful force in welding progress since 1919

31 WEST 39TH STREET • NEW YORK 18, NEW YORK

YOUR COMPANY can participate through a sustaining or supporting membership. Get the facts about A.W.S.

AMERICAN WELDING SOCIETY, 31 West 39th Street, New York 18, New York

Please send me more information on the personal and company advantages of membership in A.W.S.

NAME_____

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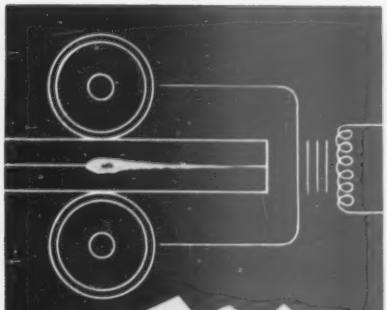
TITLE_____ CITY_____ ZONE____ STATE_____



Up to 150% longer electrode life reported by users

...that's why it pays to use AMPCO WELD* seam-welding wheels

Cut downtime and end costly production losses with Ampco Weld wheels. Laboratory controlled during manufacture, these wheels have outstanding durability and consistently high conductivity.

Ampco Weld hardness and toughness at elevated temperatures provide unusual wear resistance. Many users report up to 150% longer life with Ampco Weld seam-welding wheels.

Ampco Weld wheels are available as rough forgings, finished blanks, or completely machined to drawing, as you wish.

All meet or exceed RWMA specifications. Ampco Metal, Inc. gladly furnishes expert engineering service for specialized applications if you want it. Order Ampco Weld wheels now — and get tough with costs.

*Reg. U. S. Pat. Off., Ampco Metal, Inc. AW-6

AMPCO **Ampco Metal, Inc.**
Milwaukee 46, Wisconsin
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Dear Sir:

I appreciate your nice article, "Meet the Fish Bowl," which appeared on pages 28-30 of the March issue of WELDING ENGINEER. Harry J. Miller did a fine job on this original design of mine, but there were a few errors.

In one place, the article reads: "Outside, the building is featured by a total absence of projecting wall columns or pilasters along the 511 ft of its perimeter." It should have read "Outside *and inside* . . ." The caption under photo 3 on page 29 has the 6-in. lally columns grouted into concrete walls. These columns were actually set on centerline footings.

Another paragraph in the story should have read: "Across the tops of the 6-in. lally columns and 3½-in. sidewall pipe columns are welded, respectively, 18-in., 50-lb WF and 10-in., 21-lb WF beams. To these beams are welded the open truss bar joints that support the insulated roof panels."

Thank you for your interest. I trust we may again work together on something of mutual interest.

Sincerely,
Ralph Wesley Jones
Consulting Engineer
Philadelphia

* * *

Still more "Grass Roots"

Dear Sir:

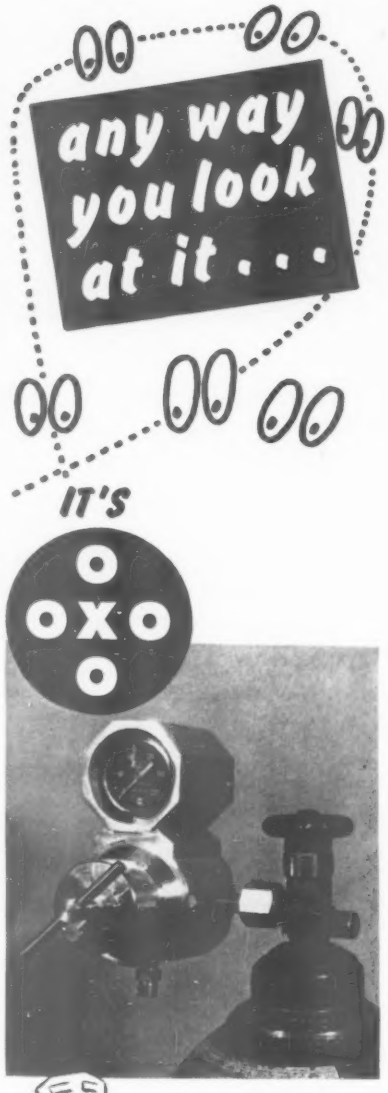
In the February issue of WELDING ENGINEER you had an article entitled "Grass Roots of Stress Control," in which was mentioned the Holt method of heat application. Where can we get information on this method?

Yours truly,
Roman Lamecker
Kral & Lamecker
Implement Co.
New Ulm, Minn.

The author of the article, Joseph Holt, will, we are sure, be glad to fill your request. His address is 14656 Sixteenth Ave. South, Seattle 88, Wash.

NEXT MONTH:

IAA convention report
Operation paradrop
Locks, fans and other problems



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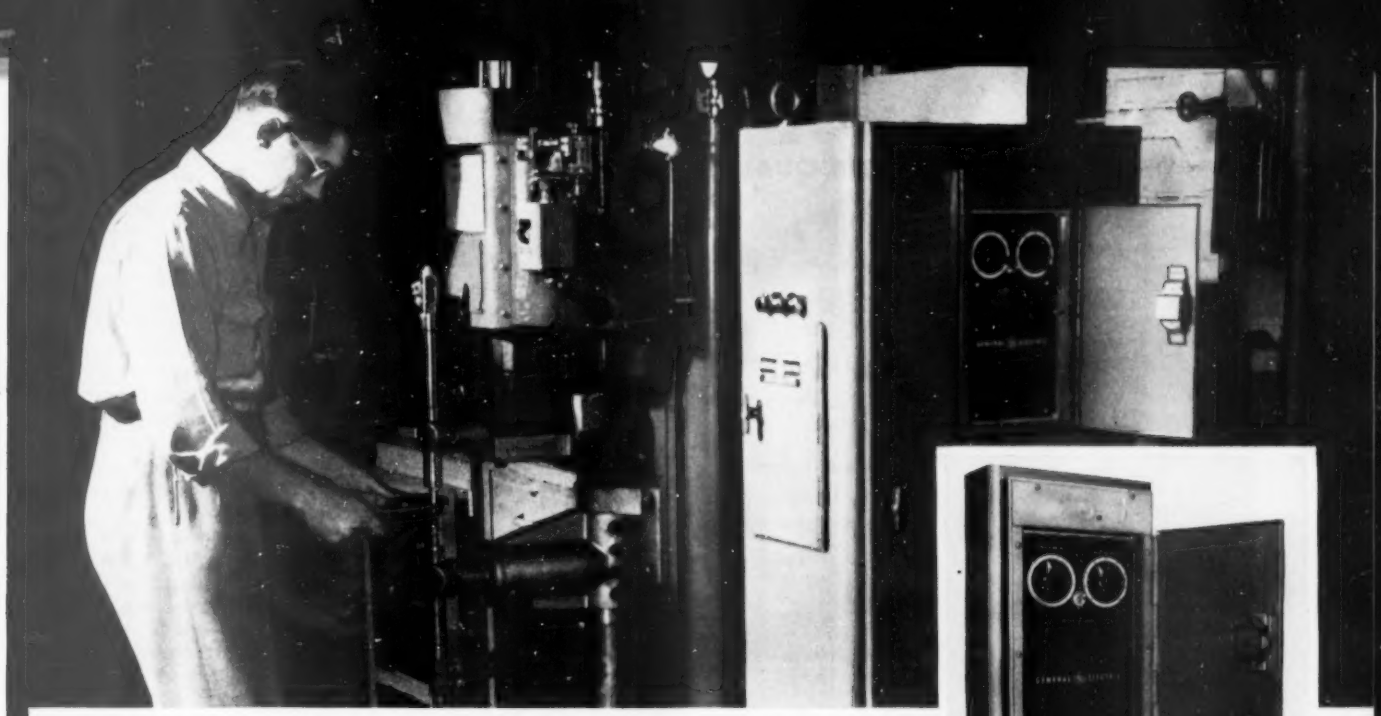

NO DETRIMENTAL FLASH, SPATTER, OR EXPULSION in welding aluminum or stainless steel assemblies when you use G-E Slope Control. Shown here applied to a G-E synchronous precision resistance welding control, this accessory overcomes the disadvantages of suddenly applied welding currents . . . gives longer electrode life and reduces tip pickup. Slope time dial is at left, heat control setting at right.

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with G-E Accessories for Resistance Welding Controls

Easily added to present equipment or included in your new G-E resistance welding control, these special-purpose G-E accessories now make possible special production performance with standard machines. They can be applied to synchronous or nonsynchronous controls.

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General Electric Company, Section C790-2
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- ☐ GEA 6075, Accessories for Resistance Welding Controls
- ☐ GEA 5945, Synchronous-precision Control
- ☐ GEA 5816, The Story of Resistance Welding—theory behind the process and complete description of all GE controls

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Company .....

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City ..... State .....

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IMPROVE WELD QUALITY—correct incoming voltage variations with G-E Voltage-compensating Regulator . . . maintains rms weld current within ±2%.

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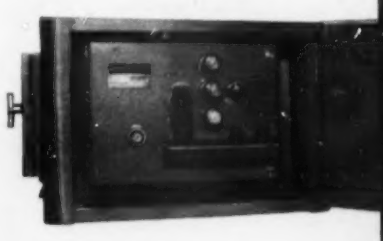

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NEWS . . . . . *from page 6*

be cast. The ore is melted by maintaining an arc between the consumable sponge electrode and the titanium metal in the base of the crucible. The electrode is melted to form a puddle. As refining progresses, impurities (in the form of slag) rise to the surface.

Because the furnace is of water-cooled copper construction and because of the high heat conductivity of titanium, the base of the "weld puddle" rapidly freezes to form an ingot of pure titanium, leaving only a progressive boiling reaction between the upper portion of the ingot and consumable electrode. All this is accomplished in an inert atmosphere of argon or an argon-helium mixture —necessary because presence of oxygen, nitrogen, carbon or hydrogen causes rapid embrittlement of titanium.

Since the melting process requires from 1½ to 5 hours of 100% duty-cycle operation, the welder must be rugged for such extremely severe service. A 1,000-amp, 100%-duty-cycle, rectifier-type welder, especially designed for such service, is used. This unit, with an open circuit of 70 to 80 volts, operates between 40 to 50 volts.

* * *

Welding clue left in $300,000 burglary

BANDITS who recently looted a Seattle safe deposit vault of close to $300,000 left behind a welding clue that may make their capture easier. The thieves used drills that had been lengthened by welding on extensions. An astute FBI agent identified the weld metal as an alloy made by Eutectic Welding Alloys Corp., Flushing, N. Y.

This diagnosis was confirmed by Irving Shaff, the firm's district engineer in Seattle. He recognized the alloy and informed police that the work had been done by an amateur weldor. Although the looting was carefully planned and executed, the crooks had little knowledge of welding materials. Information provided by Shaff opened a new line of investigation. It also narrowed the search, and police are hopeful that it will provide a valuable clue in identification of the robbers.

* * *

Standards conference set for New York in November

FIFTH annual conference on standards, sponsored by American Standards Association, will be held Nov. 15-17 at the Hotel Roosevelt, New York City.

New welding supply firm in Appleton, Wis.

VALLEY Welding Supply, Inc., is the name of a new firm in Appleton, Wis. Incorporation papers were signed by William T. and Edwin L. Hart. The latter was named registered agent for the corporation at 1236 W. Wisconsin Ave., Appleton.

* * *

G-E's X-Ray Department publishes new magazine

FIRST issue of a new industrial magazine, *Radiation Digest*, was recently published by General Electric Co.'s X-Ray Department, Milwaukee. It is being distributed to a cross-section of industry, including companies that use X-ray, electron beam and related radiation devices. David S. Goodman is editor.

* * *

MIT summer school on X-ray diffraction

METALLURGICAL applications of X-ray diffraction will be the topic of a special two-week program during this year's summer session at Massachusetts Institute of Technology. The course will run from Aug. 2 through Aug. 13 and will be directed by Dr. John T. Norton, professor in the department of metallurgy.

* * *

Alcoa had record production of aluminum last year

ALUMINUM Co. of America's annual report for 1953 stated that the firm's production of primary aluminum last year was about 30% greater than in 1952 and established a new all-time record of more than 611,000 tons. The report further noted that the company's $360,000,000 expansion program, started in 1951, should be completed in 1955.

* * *

ASTM to publish laboratory directory

THE *Directory of Commercial and College Laboratories*, which has been compiled and published by the National Bureau of Standards, U. S. Department of Commerce, will be published in the future by the American Society for Testing Materials, according to a recent agreement between the two organizations. The directory provides information concerning location of testing laboratories together with types of commodities and nature of investigations these laboratories are prepared to undertake.

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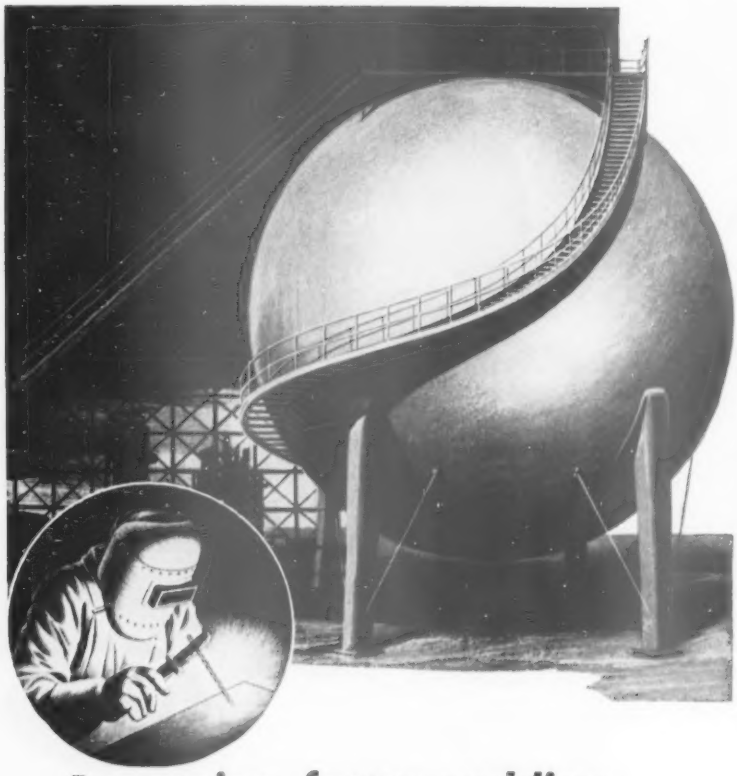

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use one electrode for all positions

Gas or liquid retaining hortonspheres are welded in the field. In the process, every welding position is used—downhand, vertical and overhead. Today, because *one electrode* can produce sound weld metal from every position, considerable time is saved by eliminating frequent electrode changes.

You can profit from this same advantage by using Arcos Low Hydrogen Electrodes for welding high tensile steels. With few exceptions, once you select the proper electrode, you can keep on welding with *one electrode*—no need to change electrodes for different welding positions. Besides saving time, inventory can be simplified. Arcos quality controls, highest in the industry, assure you dependable, uniform weld metal for every application. Write for "The ABC's of Welding High Tensile Steels".

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ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Penna.

WELD WITH ARCOS
LOW HYDROGEN ELECTRODES

Naval Ordnance develops new high-temperature alloy

An alloy that doesn't require such short-supply metals as cobalt, nickel and chromium has been developed by the U. S. Naval Ordnance Laboratory. Called "thermenol," it is said to combine high electrical resistance, corrosion resistance, reasonably high tensile strength, improved ductility and heat resistance. According to metallurgists, it is capable of replacing stainless steel in many applications.

The alloy is a modification of 16 alfenol, a magnetic material composed of 15% aluminum and 84% iron. Addition of 5% vanadium or molybdenum resulted in a surprising number of properties in one magnetic material. Thermenol is only about a quarter as heavy as stainless, and it can be heated to 2,372 F with low weight loss.

Naval Ordnance claims it is the first alloy of such high aluminum content to be developed for sheet use. But thermenol won't put other alloys out of business. It can't compete, for instance, with those containing high percentages of cobalt. Nor can it compete in many cases with titanium, a much lighter material. Inconel, containing about 80% nickel, has about double the life of thermenol at the same temperature and conditions of stress. One disadvantage of the new alloy: it has to be cold rolled, and it isn't so easy to work as some of the ordinary steels. But Ordnance has worked out a tricky process that makes it comparatively simple.

* * *

RWMA issues bulletin on dissimilar metals

"Resistance Welding of Miscellaneous and Dissimilar Metals" is the title of Bulletin No. 19, just published by Resistance Welder Manufacturers' Association, 1900 Arch St., Philadelphia 3. Presented is information on the spot, seam and flash welding of titanium, cobalt-base alloys and refractory metals as well as zinc and zinc die castings, lead and lead alloys and dissimilar metals. Included are tables and photographs. Copies may be obtained from RWMA headquarters at cost of 10 cents each.

* * *

Magnesium Ass'n meeting scheduled for November

St. Louis has been chosen as the site of the tenth annual meeting of The Magnesium Association. The dates: Nov. 15 through 17. Convention headquarters will be the Hotel Chase.

19 papers scheduled for electric welding conference

TENTATIVE program for the 1954 Conference on Electric Welding lists 19 papers to be presented. The conference, to be held May 19-21 at Milwaukee's Hotel Schroeder, is under sponsorship of the American Institute of Electrical Engineers in coöperation with the American Welding Society. This is the first such meeting to be held outside Detroit. Three previous ones were held there in 1948, 1950 and 1952.

First session on Wednesday morning, May 19, will have four papers on inert-gas arc welding; three papers on fundamental arc research will be presented that afternoon. Four papers on safety will be given during the Thursday morning session; instrumentation is the general topic of four papers to be presented that afternoon. The Friday morning session will be concerned with resistance welding, with another four papers being read.

Plant tours have been arranged at Square D Co., Cutler-Hammer, Inc., Nash Motors and A. O. Smith Corp.

Chairman of the papers committee is A. U. Welch, of General Electric Co., York, Pa. Chairman of the AIEE committee on electric welding, which arranged the conference, is E. J. Limpel, of A. O. Smith Corp., Milwaukee.

* * *

Today's jet fighters take much more metal

EVER stop to think how much metal goes into today's modern jet fighters? According to the Aircraft Industries Association, it takes 20,129 lb of steel, 19,440 lb of aluminum and 513 lb of copper to build one such aircraft. The first jet of a few years back needed only 7,198 lb of steel, 9,273 lb of aluminum and 185 lb of copper. Quite an increase!

* * *

Welding and cutting exhibition in Germany next month

AN exhibition of the latest developments in welding apparatus and welding techniques will be held at the DVS Trade Show in Grugapark, Essen, Germany, from June 12 to 21. The show is designed as a technical exhibition and sales fair for manufacturers of welding equipment. It is sponsored by the German Association for Welding Technique in coöperation with the city of Essen.

When high operating pressures call for ***strong welds . . .***

Arcos stainless electrodes can deliver top-performing weld metal for high-pressure jobs—as well as others—because the specific qualities needed are "built in" every electrode. Arcos makes many electrodes for all kinds of jobs—each requiring a different balance of physical, chemical, or metallurgical properties. But, no matter how varied the requirements, Arcos electrodes will meet every one—consistently—yielding in the flash of an arc the highest grade weld metal available today.

For more information about specific applications of Arcos quality-controlled stainless electrodes, send for booklet, "What Electrode Would You Use?"

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Mechanization is theme of Cleveland welding symposium

"MECHANIZATION for the Welding Industry" will be the general theme of the 15th annual welding symposium to be held May 14 at Hotel Allerton, Cleveland. The conference is sponsored by the Cleveland section of the American Welding Society. General chairman is Allan P. Stern, president of The Colonial Iron Works Co. Technical chairman is Joseph F. Wagner, of The Burdett Oxygen Co.

Afternoon technical sessions will feature four speakers. Thomas J. Crawford, consulting welding engineer of Detroit, will present a new welding process in his talk on "Radio-frequency Welding of Non-Ferrous Tubing." John Mikulak, of Worthington Corp., Harrison, N. J., will discuss the subject of "Mechanized Welding of Heavy Weldments." Roger S. Babcock, of Linde Air Products Co., Newark, N. J., will present a paper on mechanized uses of oxy-acetylene flame. L. Keever Stringham, of The Lincoln Electric Co., Cleveland, will discuss two new processes for "Mechanized Surfacing by Means of the Arc."

An evening banquet is scheduled for the main ballroom of the hotel. Toastmaster will be A. F. Davis, vice-president and secretary of The Lincoln Electric Co.

* * *

That notch effect in square holes

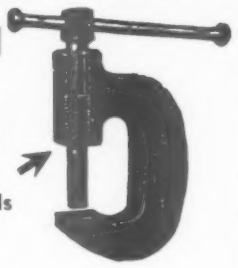
ONE of the editors of WELDING ENGINEER recently witnessed the results of cutting a square hole with the oxy-acetylene torch. Two ¾-in. square holes were cut into a 36-in. I beam, 2 in. from the edge of the 1⅛-in. thick flange. They were used to tie down the beam while it was being transported. As the beam was unloaded, it fell over on its side with about 14 ft protruding. When the top flange hit a support, that little ¾-in. hole caused a crack that traveled for a distance of over 28 in. down through the web.

* * *

Pennsalt establishes two new divisions

TWO new operating divisions—Industrial Chemicals and Chemical Specialties—have been established by Pennsylvania Salt Mfg. Co., Philadelphia. They will function as complete operating units responsible for both manufacture and sale of their respective products.

"Red Head"
WELDING CLAMPS



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1. Case hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

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How easy can you get? If you can hold a wrench and a screw-driver you can put a new seat in a SMITH'S REGULATOR in just a few minutes time. No special tools—no special skills—no long delays. That's why experienced welders pick SMITH'S REGULATORS.

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Weld axle cases for rail cars in England

AXLE-UNIT casings for 400 rail cars were recently fabricated by welding in England. The cases were made by the welding division of David Brown and Sons, Ltd., Huddersfield. This was the first time the firm used fabrication methods for this type of product.

The material used was mild steel varying in thicknesses from 1⅛ to 2½ in. All main pieces were brought together on a special jig and securely tacked. After checking of this preliminary assembly, inner ribs were welded into place. The rest of the welds were completed with the aid of balanced positioners.

Prefabrication of each outer case called for welding of 750 in. of metal, while the outer bearing housing entailed 70 in. of welding. All welded components were stress relieved to insure dimensional stability. Some advantages of the welded case: it is cheaper, lighter and can be assembled more accurately.

—*McGraw-Hill World News*

* * *

Lincoln Electric names "Dealer of Year"

THE Lincoln Electric Co.'s "Dealer of the Year" for 1953 was R. B. Cave, owner of Dakota Welding Supply Co., Watertown, S. D. Dick Cave received the scroll for his uncle during a recent dealer meeting at the Lincoln plant in Cleveland.

The supply firm during 1953 conducted 60 farm welding clinics to demonstrate methods and equipment. It also ran six welding schools to teach farmers how to weld.

Lincoln makes the annual selection from among its dealers on the basis of achievements in performance and development. The award went to Dakota Welding because its business in Lincoln equipment last year increased 250% over 1952.

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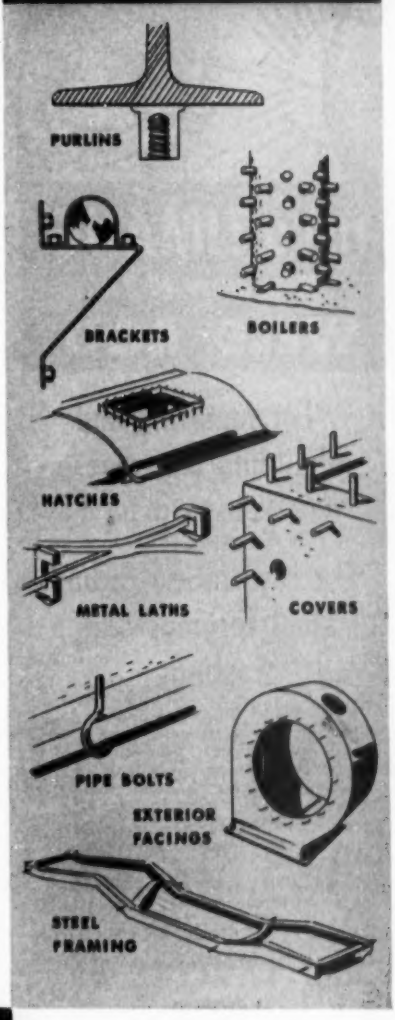
Studs can be applied at the rate of six per minute and located within tolerances as close as .005 inches. True 90 degree positioning is assured. Weld strength exceeds that of the stud and the parent metal.

Some typical uses of stud welding are suggested and types of studs available are shown here. Whether or not your needs are illustrated, think in terms of stud welding. Investigate what it can do for you. Get the complete story of KSM engineered benefits. Write KSM Products, Inc., Merchantville 8, N.J.



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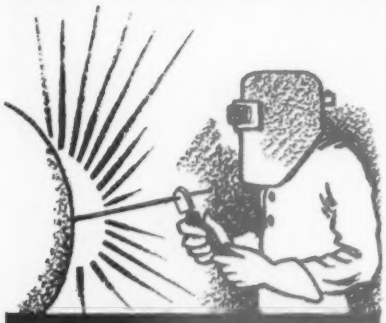

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TIMANG Weld Rod has no equal for ease of application—uniformity of welds—fusion, penetration and density. Air toughening, needs no quenching. Provides same hardness, strength and ductility as parent 12% manganese steel. Work-hardens to same degree under impact and abrasion. Available in 1/8", 5/32", 3/16" and 1/4" dia., and lengths of 14" and 18", both bare and coated. Try TIMANG!

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Radiographic inspection on Alaskan pipeline welds

WELDS on the Haines to Fairbanks, Alaska, pipeline will undergo radiographic inspection on all portions, including 100% inspection of river and railroad crossings, high-pressure piping at pump stations and tie-in welds.

Welded pipe buried along the route will receive a minimum 20% inspection by radiographic means. A minimum 10% radiographic inspection is required on surface-laid pipe and lineal welds on petroleum storage tanks. The rest of inspection will be visual.

The $220,060 inspection contract has been awarded to Isotope Products, Inc., of Houston, Texas.

Work involved in the actual laying of the line was to have started late last month. The U. S. Army Corps of Engineers is supervising construction of the $3,000,000 pipeline. Contractors are Williams Bros. Construction Co., Tulsa, Okla.; McLaughlin, Inc., Great Falls, Mont.; and Marwell Construction Co., Vancouver, B. C., Canada.

The 621-mile-long, 8-in.-welded-steel pipeline will carry motor and aviation gas and jet and diesel fuels to military bases in central Alaska from the southeastern port city of Haines. Involved in the construction are thousands of tons of seamless welded pipe.

* * *

Two operating divisions formed by Mullenbach

Two separate operating divisions have been formed by Mullenbach Electrical Mfg. Co., Los Angeles manufacturer of electrical and electronic products. They will be known as the Electrical Equipment and Electronics Divisions.

Louis S. Deris, formerly vice-president in charge of sales, has been named vice-president and general manager of the former unit. He has appointed Wayne M. Bitting and Lloyd J. Deris as sales managers.

Lloyd Deris is responsible for the sale of "Arctrol", "Gastrol" and "Spotgun" welding controls, industrial resistors and military products. Mr. Bitting is responsible for sale of industrial control and welding control products.

The Electronics Division will also have its own management. It will manufacture and sell relays using the firm's new electrostrictive-capacitive operating element. The first of these products is the "Capaswitch," an ultrasensitive relay.

fits 9 out of 10 industrial gasoline engines
•
gives long range speed selection
•
accurate "variable speed" or "constant speed" engine control between 1200 and 2200 RPM
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WORLD'S MOST EXPERIENCED GOVERNOR MANUFACTURER

"Fast Fix"

REPAIR WELDING HOSE *on-the-job*

The "Fast Fix" kit saves time, money; provides all parts and tools needed to repair or splice cutting and welding hose on-the-job. Finished work good as original. (Cable repair kits also available.)

Send for free literature!

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PHILADELPHIA 2, PA.

Gas Arc Supply
223 N. 16th Street, Philadelphia 2, Pa.

Gentlemen—Please send me more information on the "Fast Fix" Oxy-Acetylene Hose Repair Kit ☐; Cable Repair Kit ☐.

Name _____

Address _____

_____

City _____ State _____

Oxygen Service Co. changes hands

NEW owners of Oxygen Service Co., Kingsport, Tenn., are Mr. and Mrs. Robert T. Rogers, who formerly were associated with R & R Welding Supply, Des Moines, Iowa. They plan to move to a new location, at which time a welding clinic and open house are contemplated.

* * *

New York Welding Clinic attended by 746 persons

THE March welding show sponsored by the New York chapter of the American Welding Society in coöperation with 25 manufacturers attracted 746 persons. The clinic was held in New York Trade School.

* * *

Electronics conference at Chicago in October

TENTH annual National Electronics Conference is scheduled for Oct. 4-6 at the Hotel Sherman, Chicago.

* * *

McGraw-Hill announces new monthly magazine

MCGRAW-HILL Publishing Co., New York City, recently announced the inauguration of new publication to be called *Control Engineering*. The magazine will serve engineers and technically trained management men in business and industry who are engaged in the field of automation—the design or application of instrumentation and control systems for processes and machinery. W. W. Garey has been appointed publisher; editorial and advertising staffs will be announced later. First issue of the monthly magazine will be published in July or August.

* * *

Distributor appointments

Ampco Metal Inc., Milwaukee: Aweco Supply Co., Tucson, Ariz.; Virginia Welding Supply Co., Charleston, W. Va.

The Bastian-Blessing Co., Chicago: Tesco Products, Inc., Los Angeles.

Carboloy Dept., General Electric Co., Detroit: Alden Supply Co., Inc., Philadelphia.

North American Philips Co., Inc., Research & Control Instruments Division, Mount Vernon, N. Y.: Southwestern Electronics Corp., Tulsa, Okla.

A. O. Smith Corp., Milwaukee: Elk Welding Supply Corp., Woodside, L. I., N. Y.

- Working pressure remains constant
- Anodized forged aluminum bodies and bonnets
- 4000 lb. HP gauges
- Smooth flow, large capacity

Designed for today's higher cylinder pressures. Light, compact—accurate pressure control. Simple, rugged — few parts, all readily accessible. *Also new:* K-G 1200 Series Single Stage Regulators. See your K-G Distributor or send for NEW FOLDER.

DISTRIBUTORS! Valuable franchises available. Write for details.

The K-G Equipment Company (Inc.)
A Unit of Air Products, Inc.
Dept. A, Box 538, Allentown, Pa.

Tough Enough
. . . TO STAND UP UNDER SEVERE IMPACT AND ABRASION!
MANGANAL
U. S. Patents 1,876,738 - 1,947,167 - 2,021,945
11%-13½% MANGANESE - NICKEL STEEL
HOT ROLLED PLATES
Reduce Downtime on
TRUCK BOTTOMS
LAST MUCH LONGER THAN NEW BOTTOMS, TOO!
"HOW TO DO IT" DETAILS SENT ON REQUEST
Mill Depot Stocks: Newark • Wilkes Barre (Forty-Fort) Indianapolis • Chicago • Minneapolis
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NEAREST DISTRIBUTOR UPON REQUEST
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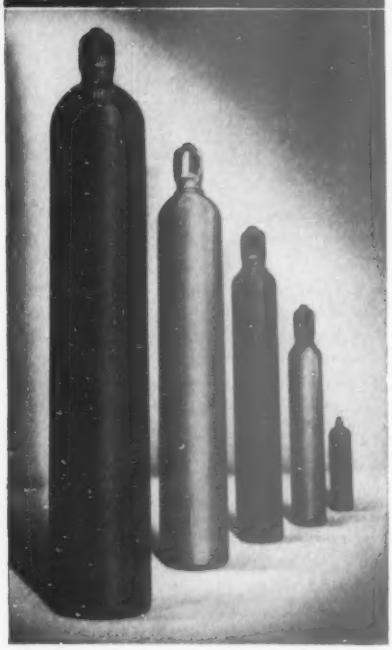
Go to cylinder specialists for quality oxygen gas cylinders



It stands to reason: there is no substitute for experience. *Harrisburg Steel* is the pioneer and world's largest manufacturer of high-pressure gas cylinders made to I.C.C. specifications. And for decades, *Harrisburg Steel* has built reliable cylinders for all branches of the Welding industry . . . cylinders possessing extra margins of *quality* and *safety* . . . cylinders that perform better and last longer. Capacities range from 14 to 400 cubic feet . . . they are manufactured in both Domestic and Export types. The next time you order oxygen gas cylinders, may we suggest that you entrust your order to *Harrisburg Steel*. Meanwhile, write for catalog and current prices.

HSC-W-1/54

101 Years in Pennsylvania's Capital

Harrisburg Steel CORPORATION HARRISBURG 15 PENNSYLVANIA

JACK JASO, WALTER ROCKWAY and CHESTER SHIRA have been added to The Lincoln Electric Co.'s staff of application engineers, who service industrial users of arc welding. Mr. Jaso has been assigned to the Chicago district, Mr. Rockway to the Cincinnati district and Mr. Shira to the Jacksonville, Fla., district.

* * *

NORMAN H. CALLNER has been appointed to the newly created position of chief project engineer for The Liquid Carbonic Corp.'s Compressed Gas Division, Chicago. He has been with the firm since 1947, when he was graduated from Massachusetts Institute of Technology.

* * *

WILLIAM E. LONG has been named sales representative for the Pontiac, Flint and Saginaw (Mich.) territories of Progressive Welder Sales Co., Detroit. Before joining the firm several years ago, he was service and maintenance engineer of resistance-welding equipment at Fisher Body Division, General Motors Corp., and an electronics technician with the U. S. Navy.

* * *

GEORGE S. BOND has been named advertising manager of P. R. Mallory & Co., Indianapolis, manufacturer of electronic, electrical and metallurgical products. A graduate of Purdue University, he has been with the firm since 1937. He had been sales manager of the company's metals and ceramics division.

* * *

B. R. MCBATH has been appointed general European manager of the Worthington Corp., Harrison, N. J., and will make his headquarters in the Paris office of the French-Worthington Co. He had been acting manager of the firm's new plant in Decatur, Ala.

TILLMAN Gloves—Garments

WELDORS BUY FROM YOUR DEALER

ASK FOR OUR NEW CATALOG

BRAZILIAN DEERSKIN THE "STAY SOFT" LEATHER GLOVES AND MITTENS

TILLMAN PRODUCTS
John Tillman & Co.
Long Beach, Calif.

ONE EXTRA DROP OF WATER CAN SKYROCKET WELDING COSTS

IT PAYS BIG DIVIDENDS to stabilize electrode moisture content with the Aridair STABILIZER

ARIDAIR
EXCLUSIVELY ARIDAIR
• Dual chemoelectric dehydrators
• Completely ventilated • Electrically heated
• Thermostatically controlled • Recessed shelving
• Multiple unit stacking • All steel construction

FRED C. ARCHER, INC.
MILWAUKEE 3, WISCONSIN

Spoor

Raney

JOHN W. SPOOR has been named to the new post of assistant division manager of Welding Products Division, A. O. Smith Corp., Milwaukee. RICHARD W. RANEY succeeds him as general sales manager. Mr. Raney had been assistant division general sales manager. ERV A. STEIDL, for the past three years sales representative for industrial safety grating in the Middle West, has been appointed Welding Products Division sales engineer for Wisconsin.

* * *

Belden Mfg. Co., Chicago, recently announced the following promotions: WARREN M. STUART, former central district manager, has been named to the newly created post of sales development manager, with headquarters in Chicago. He will continue as manager of the east central district. ROBERT N. ALVIS has been appointed west central district manager, with headquarters also in Chicago. EDWIN D. STULL, JR., formerly with the midwestern sales service division has been transferred to the Philadelphia territory and will make his headquarters in that city.

* * *

J. F. WAGNER, vice-president in charge of production, and NORMAN CARL, sales manager of The Burdett Oxygen Co., Cleveland, recently returned from a two-month tour of Germany and France. There they studied the latest developments in manufacture and distribution of liquid oxygen and other compressed industrial gases and the latest trends in gas welding and cutting equipment.

* * *

E. R. MCCLUNG has been appointed assistant manager of the Alco Products plant, Dunkirk, N. Y., of the American Locomotive Co., Schenectady, N. Y. He had been assistant manager of Alco's ordnance plant in the latter city. Mr. McClung is a graduate of the U. S. Naval Academy and is a member of the American Welding Society. He served as chairman of the Philadelphia section in 1947-1948.

...of cutting production costs!

THESE HANDS are about to *preplace* a ring of EASY-FLO low-temperature silver brazing alloy on a machined part preparatory to heating and joining the part to another.

And how does this simple act cut production costs?
Well, here's how:

Preplacing EASY-FLO is the key factor in a method of joining metals that reduces brazing to push-button simplicity and assures a steady stream of soundly brazed parts—with easily trained labor doing the whole job.

The reduction in time and labor — plus the savings in heat due to EASY-FLO's low brazing temperature—bring brazing costs down to surprisingly low figures.

Will preplacing cut your production costs?

You can find out very easily. One of our field engineers will look over your metal joining work and give you the answer – entirely without obligation. Just write and say when you'd like him to call.

WELDING SHOW BUFFALO

VISIT OUR BOOTH SEE the preplacement method in action on an actual production brazing setup. Also a cemented carbide tip brazing demonstration. Examine the many interesting examples of silver brazed parts from many industries. Talk over your metal joining problems with our brazing engineers who will be there for that purpose.

For the full facts in print, write for a copy of Bulletin 20

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MONTREAL, CANADA

The Inquiring Weldor

BY JOHN WILSON

Question: Has hard-surface welding advanced as much with "low-heat" welding rods as production and maintenance work on steels, aluminum, etc.?

Gerald W. Sharp, Linden, N. J. Let me tell you about "Operation Piercing Punch" and I think you'll agree it has. We had tried hard chrome high-heat plating on a shell punch costing $80. The life of the punch was 2,000 shells. Then, using EutecTrode 680 and 6 HSS we increased the life of the main punch to 12,000 shells. The 680 layer acted as a "shock-absorber" for the subsequent layer of EutecTrode 6 HSS. The 680 also withstood the high heat of the billet (2350). No subsequent heat treating was necessary, we got a Rc 50 reading and with heat treating could increase this to Rc 60-62. Finally, using ChamferTrode we made a tremendous saving in time and money by cutting down machinist's grinding time. That's really hard-surface welding work at its profitable best.

Question: Is welding equal to salvaging seriously broken fully machined dropped forge steel hardened to BR388?

George Gill, Phila., Pa. *Non-fusion* welding is! In our foundry, we welded two crane wheels, got that high a Brinell reading without distortion and with high tensile strength. After test welds showed only "low Amp" EutecTrode 660 would do the job, we "veed" deeply with CutTrode which gave us automatic "pre-heat" and permitted continuous welding. We let the wheels cool uncovered, took base and weld metal Brinell readings, and found "660" gave us just about the BR340 hardness of the steel. We had no distortion of flanges or bores on the wheel facings. It was almost impossible to find the welds after grinding. After a year's 18-hour-a-day service, the wheels show none of the bad wear effects previously noticed on the chilled cast iron wheels.

Question: How can you simplify delicate silver brazing on stainless steel and prevent the oxidation problems and cracking which occur so often?

William Slage, Canfield, Ohio. We weld thousands of drink dispensers joining stainless and copper components. Using "Non-Fusion" welding and EutecRod 1800 instead of silver brazing we are able to join 2 3/4 inch solid stainless steel faucet bodies to several 3/16 inch OD, .020 wall thickness, 304 stainless steel tubings. Since "1800" bonds at a lower temperature than silver alloys and "wets" better we do not have "burn throughs," we use less alloy, cut our costs and have not had a reject in over five years. Also, the "1800" welds are so neat that expensive machining and finishing costs have been virtually eliminated. Even though our equipment is subjected to notorious corrosive and electrolytic action, the unique cadmium-free EutecRod 1800 always wins the approval of government inspections.

EUTECTIC
EUTECTIC LOW TEMPERATURE WELDING ALLOYS clear up welding headaches . . . minimize warping, distortion, stresses and embrittlement. For time and money saving help on welding steels, aluminum, cast iron . . . and all "problem" alloys at temperatures below base metal melting points . . . and for stronger, safer production and maintenance welding just write "Welding Data Bank" for your free copy of "1954 Welding Data File" on your jobs.
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EUTECTIC WELDING ALLOYS CORP.
40-40 172nd St., Flushing, N. Y.

F. JEROME TONE, JR., has been named senior vice-president and FREDERICK T. KEELER has been appointed director of sales for The Carborundum Co., Niagara Falls, N. Y. A member of the board and vice-president of sales since 1942, Mr. Tone will have broad executive responsibilities in assisting the president, CLINTON F. ROBINSON, in many phases of the business. Mr. Keeler will be responsible for the functional direction of the sales programs of the company and its subsidiaries.

* * *

Pennsylvania Optical Co., Reading, Pa., recently announced the following sales appointments: RICHARD N. MCCORD was named to serve the Boston area from headquarters in Bedford, Mass.; REGIS H. VOYE was named to serve the Buffalo area from headquarters in that city.

* * *

CHARLES R. SORBER, JR., has been appointed Cincinnati district supervisor for the Metal Processing Dept. of Pennsylvania Salt Mfg. Co., Philadelphia. He will supervise sales in the St. Louis, Columbus and Indianapolis-Louisville territories.

* * *

ARTHUR A. CONRAD, JR. has joined the Detroit technical section of The International Nickel Co.'s Development and Research Division. He formerly was chief metallurgist for Precision Metalsmiths, Inc., Cleveland.

* * *

EDWARD R. BATE was recently named sales manager of Cratex Mfg. Co., San Francisco. He will assist Cratex dealers and distributors throughout the country in the sale and application of the firm's abrasive burring and polishing products.

* * *

WILLIAM M. JENSEN was recently appointed general sales manager of Forbes Steel Corp., Canonsburg, Pa. He will direct sales of welded wire fabrics, reinforcing mesh, lawn fence and flat-steel washers. New Pacific Coast representative of the firm is WARREN M. JENSEN, who will have his headquarters in San Francisco.

* * *

Died . . .

WALLACE V. EMERY, 68, long-time salesman for A. O. Smith Corp. in the Chicago area, died in Milwaukee on March 31. More recently he had been in sales research at the Milwaukee plant. He was a member of the American Welding Society.

For Permanent Good Results in Welding

METAL BOND SOLDERING AND WELDING PRODUCTS

- TINNING COMPOUND—cleans and tins in one operation
- SOLDERING SALTS—takes place of acids—fast cleaner
- HARD METAL—for scored cylinders and cast iron soldering
- ALUMINUM SOLDER—for cast or drawn aluminum and die-cast metal
- MOULDOUGH—for backing up job to weld against
- BRAZING FLUX NO. 10—for brazing all metals
- SPECIAL NO. 31—cast iron brazing flux
- SEAL-X-O—for filling pin holes in electric welds
- CAST IRON WELDING FLUX NO. 4—also All Steel Wire Brushes and Rod Holders

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Try them yourself—find out why they are so widely used. Our handy-size catalog will give you helpful advice—send for it!

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Indair's Sparky answers the demand for ARGON . . . the newest gas for inert-arc welding. ARGON is now a standard member on Indair's roster of industrial gases.

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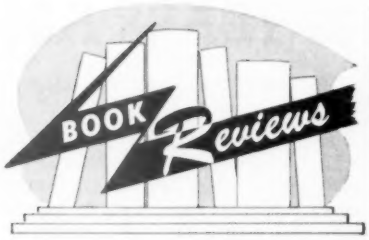
SPOKANE, WASH. • YAKIMA, WASH.
INDUSTRIAL AIR PRODUCTS OF THE SOUTH
NEW ORLEANS, LA.



Pipe problems

PIPE LAYOUT HELPS. By C. L. Hart. Published by Pipe Layout Helps, Kirkwood 22, Mo., 1953. Fabricoid, 2½ by 3¾ in., 56 pages. Price $2.

This small booklet is designed to present information on some of the most common and difficult pipe fabricating problems. It is concerned primarily with the layout of offsets and laterals, but two-piece eccentric reducers and 90-deg Y branches are also discussed briefly. Some 30 pages of tables cover pipe circumference, decimal equivalents, bolt threads, flanges, pipe schedule numbers and trigonometric tables.

* * *

Welding on the farm

FARM ARC WELDING. By V. J. Marford. Published by James F. Lincoln Arc Welding Foundation, Cleveland 17, 1954. Cloth, 5¾ by 8½ in., 456 pages. Price $2.

"Farm Arc Welding" is an edited compilation of contributions to the recent Agricultural Award and Scholarship program sponsored by the James F. Lincoln Arc Welding Foundation. As such, it becomes a handbook for building and servicing farm structures and equipment.

The volume has three parts. The first covers general welding information and discusses such pertinent topics as selection, care and operation of welding equipment, suggestions on planning and equipping a farm shop and general information on welding and cutting procedures. Section three gives useful information of general interest to the farm weldor.

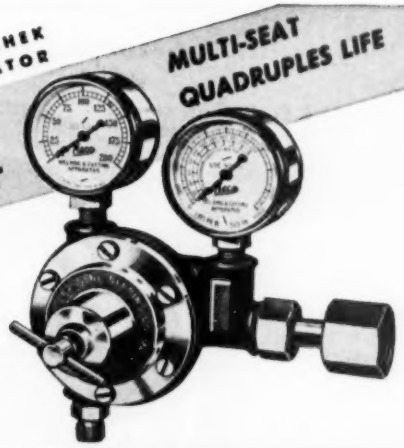
The meat of the book, however, is found in the second section, wherein 22 chapters are devoted to repair, alteration and construction of farm equipment. Practically everything on the farm made of metal is discussed —from farm buildings to household equipment. Specific subjects include: hardfacing farm tools; fabricating such items as manure loaders and spreaders; snow and earth moving equipment; tillage, fertilizer, mowing and forage handling equipment.

If there is anything of metal on the farm you want to repair or fabricate, this compact volume will tell how it can best be done by welding.

Meco SAF-T-CHEK REGULATOR

LASTS . . . 4 Times longer

MULTI-SEAT QUADRUPLES LIFE



Four times the life of ordinary regulators is guaranteed by exclusive four-seat construction. Each seat may be used successively – adjusted simply. No special tools or mechanical skill is required to maintain *any* part of the MECO regulator.

SAF-T-CHEK VALVES

This exclusive MECO construction provides insurance against seat or diaphragm failure. Built-in, self-actuating SAF-T-CHEK valves prevent damage to equipment from careless handling.

BOLTED DIAPHRAGM NEVER PUCKERS

Absolutely uniform pressure and flexibility is secured by *bolting* special alloy diaphragm – instead of conventional screw fastening which puckers diaphragm fibres. Diaphragm should last the life of the regulator.

Close yoke between diaphragm and multi-seat block insures transmission and correction of tiniest pressure variations providing constant and uniform pressure.

Meco

ASK YOUR MECO DEALER FOR FURTHER INFORMATION

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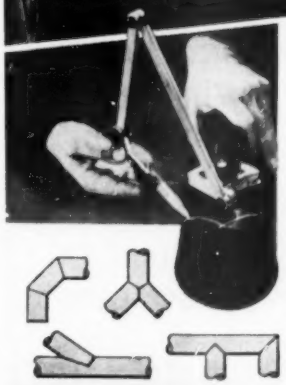
LAY OUT PIPE JOINTS *in minutes!*



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A SMOOTH SWING of the Contour Marker's soapstone point and you're ready to cut! It's easy and *absolutely accurate* because there is an angle dial calibrated in both degrees and pitch. Any of the pipe joint angles shown can be marked off in minutes. And you save "man hours" as well as oxygen and acetylene gas because "cut and try" methods are completely eliminated. Two sizes are available complete with adapter for marking structural steel. Standard, for pipes from 1½" to 18" dia.; Jumbo, for pipes from 16" to 48" dia. Instruction book included. Belt case available. Write for information

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AT THE FRONTIERS OF PROGRESS YOU'LL FIND

FOR WELDING AND CUTTING...

IN THE RED DRUM

HIGHEST QUALITY

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AN AIR REDUCTION PRODUCT

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A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED

Perfect

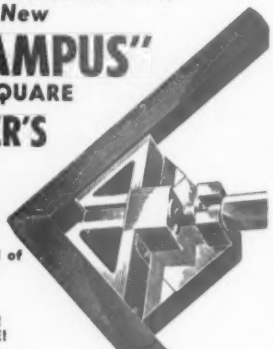
RIGHT-ANGLE WELDS

In a Fraction of the Time With the New

"GRAMPUS"

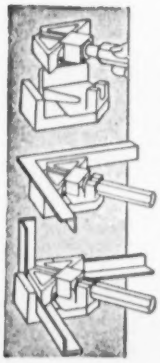
ALL SQUARE

WELDER'S VISE



A jump ahead of all holding fixtures

SPEEDY! ACCURATE! INEXPENSIVE!



Cuts down valuable time otherwise spent in setting mitred angle and other profiles, rounds and tubes for welding accurately at right angles. Work inserted is immediately ready for applying the seam and when released is free from distortion.

SPECIFICATIONS.

Model A. Profiles up to 2-in. or 1-in. diameter. Wt. 6 lbs.

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ALUMINUM WIRE —ELECTRODES

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WELDING LENSES FOR HELMETS AND GOGGLES

WELDING ALLOYS MANUFACTURING CO.

744 Broad St., Newark 2, N. J.

30 YEARS AGO

(Taken from THE WELDING ENGINEER *of May, 1924)*

GIBB Instrument Co., Bay City, Mich., will exhibit welding apparatus at the Automotive Maintenance Equipment Show, which is to be held in Detroit later this month.

—30 YEARS AGO—

H. S. TARBERT has joined the sales force of International Oxygen Co. at Pittsburgh. Newton D. Schulman is sales agent for the firm in Toledo.

—30 YEARS AGO—

STANDARD hose connections for oxygen and acetylene applications are discussed in this issue by C. J. Nyquist of Carbic Mfg. Co.

—30 YEARS AGO—

ELECTRIC welding machines and parts will be manufactured by Ness Electric Welding Machine Co., New York City, a newly incorporated firm.

—30 YEARS AGO—

THE Ox-Hydrogen Mfg. Co., Kansas City, Mo., was recently elected an active member of the Gas Products Association.

—30 YEARS AGO—

PROCEDURES followed in gas welding rotary kilns 8 ft by 125 ft are discussed in this issue by Raymond Orwig, assistant works manager of Reeves Brothers Co., Alliance, Ohio.

—30 YEARS AGO—

WELDIT Acetylene Co., Detroit, recently moved to new and larger quarters at 638 Bagley Ave.

—30 YEARS AGO—

RECENT visitors to Chicago were M. M. Smith, manager of Commercial Supply Co., New York City, and E. R. Lindsey, who is in charge of the service department of Canadian Liquid Air Co., Ltd., Montreal.

—30 YEARS AGO—

A ONE-STORY plant covering 4,000 sq ft is being built in Lansing, Mich., by Central Welding Co., which specializes in oxyacetylene welding.

—30 YEARS AGO—

REPORTS have Tulsa Oxy-Hydro Co., Tulsa, planning a branch plant in Springfield, Mo. The firm manufactures oxygen and acetylene apparatus.

—30 YEARS AGO—

SUPERIOR Welding & Machinery Co., Atlanta, Ga., will soon occupy new and larger quarters at 709 Marietta St.

SAFE—NON-TOXIC . . .

"ANTI-BORAX"

No. 4 "BRAZ-CAST" FLUX

for Bronze Welding Cast Iron

Produces finest results on Cast Iron without pre-heating or dismantling the casting. Low starting temperature—220°-250°.

ALSO

1—Cast Iron Welding Flux
2—Brazing Flux for Brass, Bronze, etc.
3—Brass, Bronze Welding Flux
5—Extra Quality Aluminum Flux
7—Steel Flux
8—Aluminum Flux
9—Stainless Steel Flux
11—Tinning Compound
12—Burnt Cast Iron Welding Flux
13—Brazing Flux for Extruded Bronzes
14—Special Brazing Flux for Aluminum Bronze, Everdur, and all Silicon Bronzes
15—Special Flux for Magnesium Alloys, Dow Metal, etc.
16—Silver Solder Paste Flux

Save on Many Important Operations

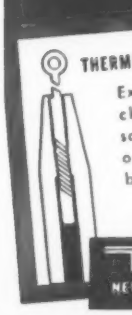
The cost is so low for ANTI-BORAX Products compared with their importance that all welders can profit by using them. All are **guaranteed—order by number.** Send for circular and **free sample.**

ANTI-BORAX COMPOUND CO., INC.
FORT WAYNE, INDIANA

SAVE 95.5%

on welding cover lens cost

We challenge you to prove this claim. Send for a FREE sample and see why we say "Thermo Triple Duty Cover Lens are guaranteed to cost less per welding foot than any other regardless of type" Send for yours today.

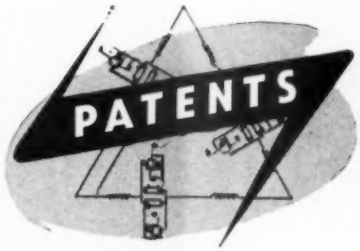


THERMO SPIRAL TIP CLEANERS

Exclusive spiral design cleans faster without scratching or enlarging orifice. Guaranteed unbreakable.

(Set of 12 in handy metal case.)

THERMACOTE CO.
NEWARK • CHICAGO • LOS ANGELES



Soldering flux

2,658,846. JOHN A. DE ROSA, Brooklyn, and CHESTER A. SNELL, New York City. Assigned to the U. S. Army. Filed Dec. 12, 1951. Granted Nov. 10, 1953.

The composition of a soldering flux is covered by this patent. The flux consists of 70 to 80 parts by weight of lanolin and 20 to 30 parts by weight of a compound selected from the group comprising monamyl acid orthophosphate and monoamyl orthophosphoric acid.

* * *

Heat treating

2,655,457. COLUMBUS VERDI, Waukegan, Ill. Assigned to Fansteel Metallurgical Corp., North Chicago, Ill. Filed July 26, 1951. Granted Oct. 13, 1953.

A method for increasing the mechanical strength of sintered tungsten-nickel alloys, without appreciably increasing their hardness, is covered by this patent. Involved are alloys containing from about 5% to about 45% nickel and the balance tungsten. The sintered alloy is heated to a temperature between 1,000 C and 1,200 C. The heated alloy is then quenched and subjected to heat treatment at a temperature of from 500 C to about 700 C.

* * *

Remote-control system

2,658,132. CLAUDE A. WELCH, Cincinnati. Assigned to Welch Electric Co., Inc., Cincinnati. Filed Jan. 6, 1950. Granted Nov. 3, 1953.

This patent concerns a system for remote control of the output of a d-c welding generator that supplies current by adjustment of the generator field excitation. The system includes a supply circuit with a rectifier and a saturable reactor for controlling the a-c input from its source to the rectifier. The system's control circuit has a control winding on the reactor and a variable resistance installed in the handle of one of the electrode holders. Variation in resistance results in control of the energy supply, adjustment of the a-c input and consequent adjustment of the rectified a-c input to the generator field.

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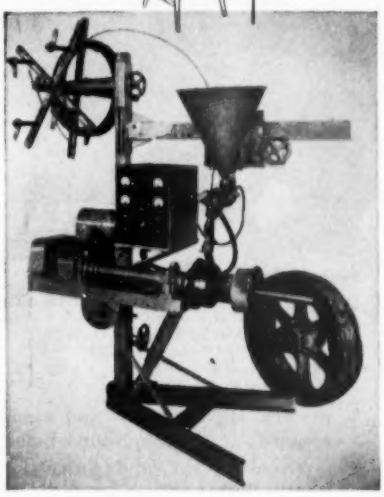

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A

Air Reduction Sales Co. 13
Allen Co., L. B. 104
Alloy Rods Company 15
All-State Welding Alloys Co., Inc. 94
American Brass Co., The 9
American Chain & Cable Co., Inc. 83
American Solder & Flux Company 78
American Wheelabrator & Equip. Corp. 39
American Welding Society 87
Ampco Metal, Inc. 80, 88
Anti-Borax Compound Co. 103
Archer, Inc., Fred C. 98
Arcos Corp. 92, 93
Atlantic Abrasive Corp. 82

B

Belden Mfg. Co. ..... Inside Front Cover
Belmont Abrasives 102
Bridgeport Brass Co. 85

C

Cam-Lok Div. Empire Products, Inc. 80
Chicago Boiler Company 94
Chicago Eye Shield Company 2
Contour Marker Corp. 101

D

Dockson Corp. 19
Drawalloy Corp. 90

E

Eastman Kodak Company 32
Eutectic Welding Alloys Co. 100

F

Federal Machine & Welder Co. 73

G

Gas-Arc Supply 96
General Electric Company 26, 27, 89
Glenn Co. 29
Goldsmith Bros. Smelting & Refining Co. 91

H

Handy & Harman 99
Harnischfeger Corp. 20-21
Harrisburg Steel Corp. 98
Harris Calorific Co., The 14
Haynes Stellite Co., Div. of Union Carbide & Carbon Corp. 24
Hobart Bros. Co. 1

I

Independent Eng. Co., Inc. 84
Industrial Air Products Co. 100
International Nickel Co., Inc. 69
Invincible Vacuum Cleaner Mfg. Co. 67

J

Jackson Products 4

K

K-G Equipment Co. (Inc.) 97
KSM Products, Inc. 95

L

Lincoln Electric Co., The 40
Lindberg Engineering Company 23
Linde Air Products Co., A Div. of Union Carbon & Carbide Corp. 70

M

Mallory & Co., Inc., P. R. 22
Metal Bond Mfg. Co. 100
Metal & Thermit Corp. 10
Mid-States Welder Mfg. Co. 104
Miller Electric Mfg. Co. 30-31
Modern Eng. Co., Inc. 101

N

National Carbide Corp. 102
National Cylinder Gas Co. 77
National Welding Equipment Co. 7

O

Oxo Welding Equipment Co. 88

P

Page Steel & Wire Division 83
Pandjiris Weldment Co. 11
Pennsylvania Optical Co. 25
Phoenix Products Co. 86
Pierce Governor Co., Inc., The 96

R

Rankin Mfg. Co. 86
Ross Operating Valves Co. 75
Ruemelin Mfg. Company 78

S

Sellstrom Mfg. Company 12
Sight Feed Generator Co. 103
Smith Corp., A. O. ..... Back Cover inserts bind between 34-39
Smith Welding Equipment Co. 94
Stultz-Sickles Co. 97
Sylvania Elec. Products ..... Inside Back Cover

T

Taylor-Wharton Iron & Steel Co. 96
Tempil Corp. 84
Thermacote Company 103
Tillman Co., John 98
Tracerlab, Inc. 90

U

Union Carbide & Carbon Corp., Haynes Stellite Company 24
Union Carbide & Carbon Corp., Linde Air Products Co. 70
United States Steel Corp. 8
United States Steel Supply 8

V

Vernon Tool Co., Ltd. 82
Victor Equipment Co. 42

W

Wagner Mfg. Company 18
Welding Alloys Mfg. Co. 102
Welding Fittings Corp. 79
Westinghouse Electric Corp. 16-17
Worthington Corporation 81

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.

EMPLOYMENT

Positions Vacant 104, 105
Selling Opportunities Offered 104

EDUCATIONAL

Books 105
Schools 104, 105

BUSINESS OPPORTUNITIES

Offered 105

EQUIPMENT

(Used or Surplus New) For Sale 105

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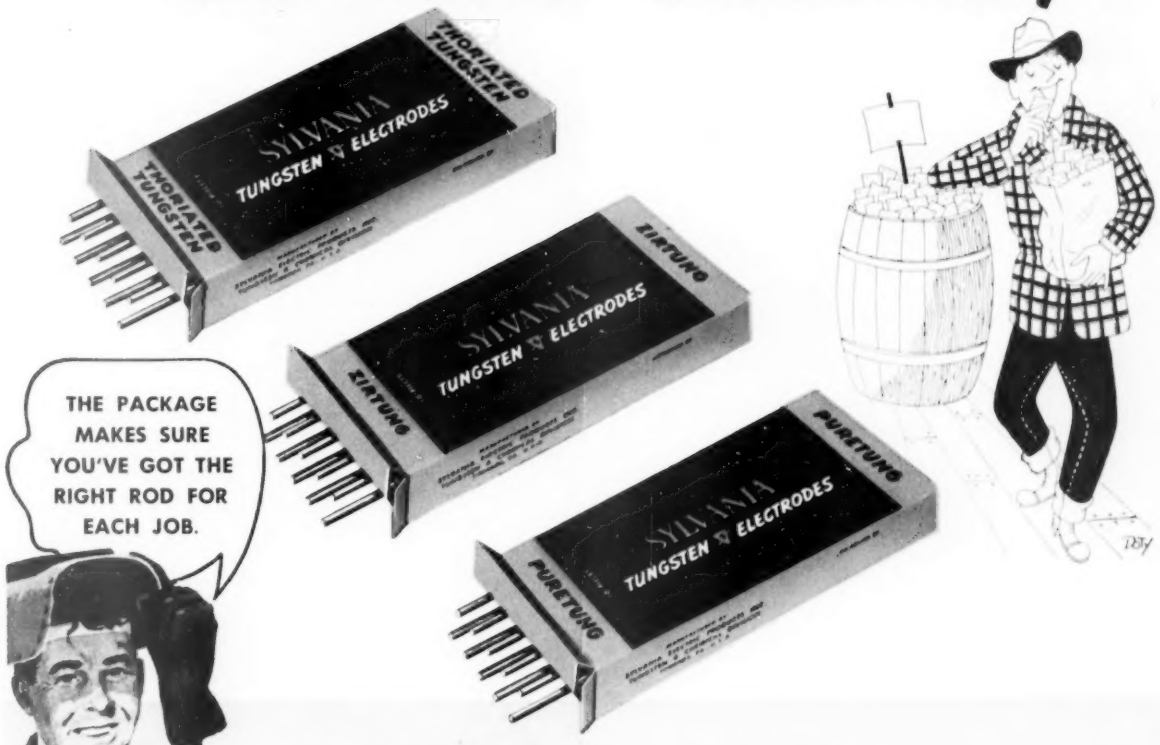

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